

AVIATION WEEK

50 CENTS

HE'S SINKING
AN UNSEEN
SUB



DESIGN ENGINEERS started with the latest electronic gear to seek a submerged sub and the armament to sink it. Around this mass, they created an aircraft. With slide-rule and calculator, they flew her on paper.

From these flights in figures, and from models in wind tunnels, came data demanding change. Often formulae gave the answer, often the ingenuity of Grumman specialists in aerodynamics, stress, weight control, metallurgy, and production.

They detailed her anatomy, until all her thousands of parts were ink lines and numbers. These became metal, hand cut and formed with precision. Carefully the first experimental model was built.

But long before the Grumman S2F-1 flew and confirmed their figures on paper, they were busy on a revolution — *— Editho edna*

Grumman salutes National Engineers Week

SUNDSTRAND



Nose cone mounting of Sundstrand Constant Speed Drive requires
less space, less weight, eliminates separate oil reservoir



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Mounting in nose cones, or unenclosed cockpit pods, this type of drive is extremely compact, of lighter weight. Engines of 60 hp and up, represent reservoirs of oil under required hydraulic and aerodynamic conditions, may result in added weight. Maximum high efficiency, even at extremely high altitude.

Sundstrand engineers have concentrated their development work to provide you with the exact type of Constant Speed Drive which will best meet your altitude or engine drag requirements. Each of the drives employs the fundamental principle of positive speed conversion developed by Sundstrand in cooperation with the United States and leading manufacturers in the aircraft industry. Each of the drives has

the precision construction and reliable performance which have built Sundstrand's reputation. Each of the drives has special characteristics developed for a specific type of application. For a complete review of all models available, and suggestions on applications to your drag problems, get in touch with us. Take advantage of Sundstrand's valuable research, expert engineering, and precise production.



SUNDSTRAND AIRCRAFT HYDRAULICS

INDUSTRIAL HYDRAULIC DIVISION, DEPARTMENT III

AIRCRAFT AND INDUSTRIAL HYDRAULIC TRANSMISSIONS - PUMPS, MOTORS AND VALVES - OIL RESERVOIRS - AIR HANDLES
LADIES - DESIGN - REDESIGN AND SPECIAL MODELS - BRAKE CHAMBERS - HYDRAULIC CYLINDERS

B.F. Goodrich



8 miles high without bubble trouble

THE CAPTION above was found in a flight manual of the North American Sabre. It describes the problem of "bubble trouble" which occurs when the aircraft flies at high altitude. At 8 miles high, the air pressure is so low that the cockpit windows become brittle and crack under the effects of high pressure on the inside, low pressure on the outside.

B. F. Goodrich engineers, called in by the manufacturer, studied the problem. A really effective seal, they believed, should prevent any air leak, not just at 8 miles, but at much lower altitudes, perhaps, down to sea level. They searched for a seal with a solid base fastened to the rear of the cockpit and a rubberized fabric covering that simply after being inflated

to form the sealing tube. When this valve inflates, it works like blowing up a paper bag—the pressure brings it in on full expansion and doesn't stretch the fabric enough to injure it. Designers soon discovered that a valve well (like blowing up a toy balloon) is idealized.

The new seal works superbly. Even at around 60° it inflates with less pressure than anyone had needed at room temperature. There are other applications for this seal, too. It can be used to seal rooms with air exchange holes that are subject to high winds, for example. In such and similar places, sliding seals and sealing tape are considered to be proved in respect that it has been adopted by McDonnell

Boat, Chance Vought Corsair, North American Sabre and other airplanes besides the North American.

This new type seal is one of many developments in aviation that have come from B. F. Goodrich rubber research and engineering. Other aviation products include tires, wheels and breakers, heat-resistant rubbers, De-Icing Agents, Plastic-coat adhesives, Pressure Sealing Zippers, fuel cells, Kevlar, urethane. The B. F. Goodrich Company, Akron Division, Akron, Ohio.

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FINE IN RUBBER

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MORE BRAINS
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Aviation Week

Editor: **Walter G. Johnson**

Volume 58

February 23, 1953

Number 8

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Chase Assault Transports are designed especially to meet the existing requirements of the Air Force and Army.

No other planes are capable of delivering vehicles, weapons and troops to forward combat areas by landing — or extracting casualties from hospitals direct to rear area hospitals.

AIRTRIC - Truly the front line express.

CHASE AIRCRAFT CO., Inc.
WEST TRENTON, NEW JERSEY

AVIATION CALENDAR

- Feb. 13-14—Conservation Panel of the Aircraft Industries Assn., Convair plant, Pt. Mugu, Calif.
- Feb. 15-Mar. 1—Seventh annual Pacific Coast Metal Workers Spring Meet, Tropicana Hotel East, San Diego, Calif.
- Mar. 19-21—Eleventh Annual Conference, Society of the Plastic Industry Council, 1000 Crystal Beach Road, Niagara Falls, Canada
- Mar. 17-19—25th Annual Meeting, American Society of Tool Engineers, Hotel Statler, Detroit
- Mar. 25-26—Third Midwestern Conference on Fluid Mechanics, University of Minnesota, Minneapolis
- Mar. 26-28—Institute of Radio Engineers National Convention, Wyndham America and Grand Central Palace, New York, N. Y.
- Mar. 29-31—Fifth Western Metal Exposition and Congress, Pan-Pacific Auditorium, Los Angeles
- Mar. 21-26—Congress of Civil Aviation Conference, a joint meeting of trade organizations, theme 50 years of aviation progress. American Association of Airport Operators, Indianapolis, Indiana, and simultaneously, Kansas City, Mo. Mr. George L. Johnson manager, Ross C. Bauch, P. O. Box 115, Kansas City 46, Mo.
- Mar. 21-27—National Production Board of the SAE, Hotel Statler, Cleveland, Ohio
- Mar. 31-Apr. 2—First International Major Mine Emergency, National Guard Assembly, Washington, D. C.
- Apr. 4-12—Second Annual International Motor Vehicle Special Show, Convair Central Palace, New York, N. Y.
- Apr. 26-28—Aeronautical Production Forum, National Aerospace Meeting and Aircraft Engineering Aspects (NAECA), Hotel Cavalier Clinton and Hotel Statler, New York, N. Y.
- Apr. 26-May 1—International Conference of Trade and Commodity Associations, Hotel Statler, San Francisco, Calif. Helicopter Navigation will be a principal issue
- Apr. 28-May 2—First annual National Transportation Handicapped Handicap Air Cruise for private planes of 100 hp. or less. Fliebig Field, Lake Arrowhead, Calif., sponsored by Professional Jetset, Inc., chairman of the Committee
- Apr. 29-May 1—1975 Electronics Components Show, Interplex, Stamford, Conn., Stamford Civic Center, Stamford, Conn.
- June 9-11—Second International Aviation Trade Show, Hotel Statler, New York, N. Y.
- Sept. 7-11—1975 SBAC Convention Year Flying Display, Farnborough, Hampshire, England

PICTURE CREDITS

- 4—Peter Aretsky, 4-chner (left) International Motor Hill Ward, known under banner name Levy II—Gaines Wright, 15—Eppa Avantchuk, Cr. 11—Gordon



BRISTOL 171 MK. 1—Twin turboshaft engine (above) is seen on a test flight. It can carry 21 passengers. Later Mk. 3 will be fitted with skid wings.



BRISTOL 171 MK. 1B—RAAF evacuation crypto differs from civil 171 in longer landing gear, hydrologic search and lower nose threshold.



SIKORSKY S-61N—Singleplace S-61 is powered by a Turbomeca Palasite jet. Empty weight is 1560 lbs. First flight Jan. 2.



MARTIN-CURTIS MC-101—Aviation new French crypto (below, left and right) is a two-engine of unusual configuration. Its 160-hp engine is mounted above the cockpit. Empty weight is 1100 lb., cruising speed of 60 mph, endurance 2 hr.



ODM Shuffles Aircraft Production Setup

- New group coordinates all defense output.
- Program is designed to keep production high.

By Alexander McMurtry

A new Washington defense product line designed to handle aircraft and electronics program more closely coordinated with other defense products programs was being formed last week by the Office of Defense Management.

It is expected out of existence the Aircraft Production Board and Electronics Production Board which had been handling production problems for their industries.

New steps for the aircraft and electronics industries to date are:

- John Pauschke**, coordinator of aircraft production.

- Justin Sipley**, coordinator of electronic production.

They are in a co-equal status with three other coordinators of Atomic Energy Commission, aerospace tools, and nuclear power and construction programs in the newly organized production division of ODM, headed by James A. Williams, director.

Polymer Group-Williams also serves as chairman of the Production Executive Committee, policy-making group that includes the Assistant Secretary of Commerce, a representative of the Department of Defense, representatives of the Missouri Board, Air Force, Navy and Army, and additional major managers from federal agencies as needed.

Industry Representation-The new center is also in line as members in industry representatives selected by the divisions.

Williams told AVIATION WEEK he expected the industry representatives at the policy level would be as important factor in keeping the program cohesive and workable.

Capt. N. W. Reynolds, Air Force Col. Samuel Hale, and an Army representative not named were selected as liaison between the production center and their respective services on day-to-day problems.

While the new setup still is in a formative stage of an evolutionary model, it already reflects the thinking

ODM's New Production Division . . .

Division director and chairman of Production Executive Committee-James A. Williams
Liaison-Capt. N. W. Reynolds, Navy; Col. Samuel Hale, Air Force; Army representative
Coordinator, aircraft production-John Pauschke; four assistants: V. B. Lee, secretary;
Coordinator, electronic production-Justin Sipley; Assistant: R. A. Van Volberg; A. L. Heimker, secretary
Coordinator, Atomic Energy Committee-Zeta Taylor
Coordinator, aerospace tools-Col. Louis Kossow, USAF

Pilot-making organization for division is production executive committee. Divs also include a committee of liaison and members include Assistant Secretary of Commerce, representative of Department of Defense designated by Secretary of Defense, representatives of Missouri Board, Navy, Army, and Air Force, additional representatives of other government agencies, and representatives of industry in the division they designate.

of President Reagan's new Adminstration to centralize and consolidate the management of defense agencies.

Atomic officials say the Aircraft Production Board has generally speaking accomplished the job it was assigned to do and has served its purpose of helping get the aircraft industry geared to the present high market.

Crude as the Adminstrative improvements may have been, Capt. Robert E. Berr, Air Force Col. chief who last year rejected last May to return to a job in a division manager of General Motors Corp., and to his assistant Alaa Radia, for staff work under Berr and subsequent leadership of APB program along the project team established by Radia, Radia's job was eliminated in the reorganization, and he is taking a vacation.

Indications are that the new coordinator will be able to better serve the aircraft industry through a more effective problem-solving approach to aircraft production problems until the end of the Controlled Materials Plan June 30.

Williams said his division will be setting up a new service to the military agencies, and if they do not think it is worthwhile after a trial period in its initial stages, "we can fold the whole thing and leave."

No Aviation Background-Pauschke told AVIATION WEEK he was a shop plant production specialist but not an aircraft one. His principal previous industry experience has been in general management of nuclear power and equipment for Texas Public Retailer, Dallas. He served with the nuclear 22

states in various parts. Pauschke came to Washington last June on special defense production assignments most of which were concerned with the tank program until his present job.

He expects to move his interests in production operations to the aircraft field. Their assignments will be:

- Aerospace** including wind-turbine, aircraft, missile, surface controls, transportation and fuel tanks.

- Power Generation** including engine and accessories, generator and turbines, fuel systems, control units, hydroelectric and hydrocarbon systems, nuclear and thermal ones.

- Electrical and electronic** status concerning power systems, instruments, communications, electrical systems, medium current, antiicing, engine controls and fuel prevention controls.

- Spatial instruments** President said he would specialize in spatial plant production experience and that aircraft would be measured on a short time scale.

- Machinist Tools** Head-Col. Louis Kossow, former commander of machinists tools for the Production Division, was loaned by the Air Force to the new space defense administration to work on aircraft production problems and is reported as an experienced administrator in this field.

Williams will be holding the production division post temporarily to complete the division and is looking for a man to fill the post when Williams returns to his former job in assistant to Ralph Trapp, Acting Assistant Director ODM.

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CMP Status-Clarifying the new arrangement on the Controlled Materials Plan and long-term liaison, Williams said that all CMP sales information must be licensed before the production of the item controlled materials-start, discussions and outcome are accepted way entered.

Aircraft industry observers speculated, however, that the new arrangement probably will leave aircraft, engine and component manufacturers holding their own to place all their orders for each quarter instead of half-yearly. This would give aircraft manufacturers more time to hold back production and to take advantage of cost reductions between industry and government, since it occasionally resulted in some matches being held up throughout a quarter and not being used.

On the other hand, the aircraft industry position was based on efforts to keep matching and inventory down and to be able to take advantage of price shifts within a quarter.

Williams dismissed the former idea with Atomic Energy Commission, aerospace Production Board, and Facilities Review Board as representatives that had many of the same members as the Production Executive Committee. He and the three boards also had duplicate functions. The new organization is "nothing like these boards look alike," Pauschke Executive Committee, Williams said.

The new Production Division director and electronics division problems would be handled between the two, and no aircraft coordination for the two would be handled by the aircraft production specialist in coordination with the aircraft coordinator, and that generally would be less "coordinated" independent but duplicating several functions.

After June 30-The materials control period after June 30 still is not clear, except for plans to see that military items are filled and in take-up of some other exceptional production, Williams said.

Williams said into this latter category will be the spelled out, but there is where the new module may be of most concern to the aircraft industry. The possible transport aircraft will come in to get contracts on a priority basis when needed, but this has not yet been put down in black and white. Other civilian aircraft, affected a limited number of CMP items, may be forced upon to shift for themselves for materials, unless specific new arrangements can be made.

The small aviation aircraft industry previously was awarded market allocation on a basis of normal business transportation and material agricultural uses, along with a move to keep a limited production of light aircraft for all model procurement by the second service. Presently, this situation still holds, but industry may have to argue it all over again to raise it.

C-46 Safety

- Recertification tests slated for all models.**
- New CAB regulation cuts plane's weight limits.**

Civil Accessories Board will cut the maximum operating weight limit for Cessna C-46 passenger operation by 760 lb., effective Apr. 1. But CAB's new special safety regulation reduces the load only on planes not yet modified to the "slipped" version of the Boeing Standard aluminum propeller "or in equivalent equivalent."

On Dec. 1, 1982, Boeing, noting that "increasing" special safety regulation, initiated a recall warning that the plane must be recertified by Dec. 31, 1983, meeting "an full" the strict load requirements of Part 65 (transport category) of the Civil Air Regulation. The plane currently is certified under a non-transport regulation.

The main passenger-carrying C-46 operators must pass the plane through flight tests this year. The tests will decide the future payload and usage of the aircraft. Civil Accessories Board will grant for the Cessna C-46. Test results will determine what CAB will and won't expect of modification of the C-46 model.

C-46 improvements being developed at American Aviation, Morris, Illinois (see page 31) still are being evaluated by the Civil Aviation Adminstration. When that by the end of this year the changes will have plenty of CAB to implement for safety. CAB and other aircraft certification inspection. The main problem for standard operation will be financing the capital cost of the C-46 modification. However, since it is seven for the C-46 engine's greater power as the answer to long-haul side load residual operational life of the C-46.

Without the C-16 engine, owner operator of the C-46 modification sought single range from \$80,000 to \$60,000 lb. The lower figure already would heat the C-46 for economic use in revenue cargo.

Great Wright Changes-The special modification required for emergency rule CAB issued a year ago, cutting all C-46s to a maximum gross of 45,000

lb. for passenger operation. The new weight limit for all model procurement by the second service. Presently, this situation still holds, but industry may have to argue it all over again to raise it.

The new Board rule starts out by reducing C-46 weight to 44,300 lb. not than allows up to 1,000 lb. more for planes using clipped propellers. The C-46 and F models originally were certified for gross weight of 48,000 lb., and they use Boeing Standard aluminum propeller. Trimming the plane ends more than allowable gross to 45,000 lb.

The C-46 and F models were certified for only 44,000 lb. and they have Cessna steel propeller. To move them from the new 44,300 lb. to a top load of 45,000 lb requires conversion to aluminum propeller under the new regulation.

Further Changes-The CAB will set the extra 1,000 lb. allowances for clipped propeller as "permitted" until each year at the (CAA) administrative rate later determined by the manufacturer to be comparable to the additional allowances available by the use of such propellers. However, CAB officials indicate officially they plan no such change, as the flight testing before the Dec. 31 deadline will CAB for complete certification.

The Board also states that "any review of the C-46 performance capability has led us to the conclusion that there should be no general exception from the transport category square wheel, particularly with respect to the required performance requirements at seat load."

The Board concludes "Therefore, and after Jan. 1, 1984, the C-46 will be required to comply as full with both safety performance requirements, together with such additional standards of the transport category as the Board may decide are necessary to the interest of safety for non-transport category aircraft."

Red Night Fighters Use Airborne Radar

Indications that Communist night fighters are using airborne radar to attack U.S. fighters and bombers are evident in low combat reports from Korea.

Plant evidence that Red night fighters have a better办法 of tracking Allied aircraft than those from ground radar stations and visual and from searchlights come in reports of Capt. Giang Khoa, a Manchurian P-10 fighter pilot who was shot down for losses in enemy night fighter after taking violent evasive action.

The Manchurian pilot initially was in

formed that so many night fighters was shown on base about five miles away. After taking evasive action at approximately 18,000 ft for about five minutes, Koss was warned that the cancer plane still was on his tail. Shortly thereafter the Skyraider was hit by tracer fire from one wing.

Supersonic Dive "Splitterizing" over trying the cancer plane, Koss got out 200 ft above the other, then coasted built up to an airspeed of about 710 mph. (March 1, 1952) before pulling out at about 6,000 ft and recovering safely to the Marine base. Extrication of the Skyraider costled no structural damage, although the dog's bombardment of the aircraft are nearly unknown.

Military observers believe the Red night fighters would have been unable to follow the Skyraider's evasive action without losing the assistance of air base radar.

Two successive dispatches from Royal Air Force Farnborough, the British Air Force confirmed the fact reported in Aviation Week (Feb. 9, p. 11) that Douglas Skyrailman, former by Marines had been captured by six Red night fighters. RAF also announced that Lockheed F-94B night fighters were en route over Korea and had destroyed one enemy night fighter, with them the four more kills still in the process of evolution. The F-94 night fighters have been in Korea for more than a year.

CAB Opens Hearing On Nonskied Crash

Civil Aeronautics Board planned to start passenger accident investigation hearings last Friday on the separation Jan. 7 C-46 crash fatal to all 46 aboard near Flax River, Okla., in the Rock Mountains.

The plane was operated under mail charter by American Air Transport Inc., a nonchartered carrier.

The investigation made a public safety report at 11,000 ft in the first week of April and will be completed in 10,000 hr maximum. The plane was on the primary route. No emergency broadcast was received before the crash.

A Civil Air Patrol search plane found the wreckage five days later. An Air Force media spokesman is best suited to answer.

On the next day, two CAB investigators and some Air Force personnel went to the scene. They found that deep snow and ice would prevent for their investigation of the crash scene until spring.

This was the first fatal accident since the return of scheduled and nonchartered flights around New York's Little Rock since 1949.

CAB will hold supplemental hearings after detailed investigation that spring



FRONT VIEW of model of Lockheed's new turboprop-powered C-130 transport, and . . .



REAR VIEW, showing uprooted tail and one cargo door which can be used in emergency.

Details of New Turboprop C-130

Lockheed Aircraft Corp. released details this week of its new Air Force C-130 cargo and cargo plane, the first U.S. transport designed from scratch for turboprop engine power.

Contractor for the C-130 will be Allis-Chalmers, engine builder for the four Wright three-bladed turbosupercharged propellers.

The squat, four-engine aircraft will fly faster and higher than any current military cargo plane. Lockheed says, and will be able to make short landings and landing runs. Range coverage will be prominent.

Details—Designed by Lockheed in Air Force requirements, the C-130 is a high-wing, low-drag transport with a special tendon-sheath inclosed landing gear that allows operation from rough terrain or rocky fields or sandbars in desert regions.

The range of the transport is approximately double landing range for a range that is used as an air-ground loading strip or for discharge of cargo and passengers during flight. A second large cargo door is built in the forward section of the fuselage.

Dimensions of the C-130—wingspan, 112 ft, fuselage length, 85 ft, height, 31 ft. Cargo capacity and performance data were not disclosed.

Commercial Use—Under a memorandum of understanding of the Military Air Transport Service, the C-130 is a major step toward production of jet transports aircraft in the United States.

The new transport may prove to be a big advance in increasing overall flexibility of the military air cargo fleet, though size and mission should limit the C-130's capable freight-passenger cargo.

Features of the C-130 are under construction at Lockheed's Burbank, Calif., factory, and additional production facilities are under construction at Marietta, Ga., plant.

First flight date of the new cargo plane is not revealed, but last fall, it had landed. Lockheed was president-engineering, producer the C-130 will operate more economically than existing military transports and will "perform a variety of air jobs." He uses it as a "simple, rugged airplane."

James Douglas Slated As AF Undersecretary

James Henderson Douglas, Jr., 43, a decorated World War II Army pilot and chief of staff of the Air Transport Command, as recommended last week as Undersecretary of the Air Force.

Douglas, a Chicago lawyer, was selected for the Undersecretary post after the Eisenhower Administration decided to withdraw the nomination of Robert Chapman Sprague, Milwaukee utility entrepreneur, because he declined to allow his stock interest in the Sprague Electric Co. (Aviation Week, Feb. 16, p. 17).

Douglas was the Disengaged Service Medal for his World War II service in a combat ATC. He was an industry liaison in World War I, born in Cedar Rapids, Iowa, he attended Princeton University, Harvard Law School and Cambridge University in England. He has been connected with Chicago law firms and investment banking since 1941 and is currently a member of the law firm of Gundersen, Curran & Douglas.

Added chairman of the Senate Armed Services Committee, Sen. John Stennis:

Structural Problem Probed in DC-6 Crash

Investigation was continuing last week to determine if a structural problem involved in the fatal crash on the Gulf of Mexico of a National Airlines' DC-6. Forty-six passengers and crew were killed in the Dec. 14 mishap.

National's flight, headed for New Orleans from Tampa, had undergone extensive modification to the wing fol-

lowing a CAA directive on DC-6 air craft modifications, an official of CAB's Air Carrier Safety Division reported. All aircraft using the DC-6 were ordered last July to seek the forward fuselage area for cracking or fatigue of internal members in both wings.

Two National DC-6s last year experienced considerable drag and loss of air after flying through heavy turbulence. The fatal DC-6 crash occurred during a heavy storm over the Gulf. After National's initial trouble last year, Douglas Aircraft (DC-6 builder) immediately asked airlines to keep close tabs for skin damage on DC-6 wings until an exhaustive investigation could be made.

CANADA—In a newspaper despatch last July, ruled that by Sept. 1, 1953, the nation must complete modification of the wing section in the area where National had experienced trouble. Meanwhile, while the CAA directionaries were ordered to inspect the forward flaps of DC-6, DC-6A and DC-6B wings every 15 hr or more, which led to skins 4,000 hr or more.

Added chairman after investigating parts weighing 150 lb are needed to the structure to strengthen the forward part of the wing. The aim, however, seems about to let off such tails of the modified models.

RAF Offers to Train German Air Force

(McGraw-Hill World News)

London—In a move aimed at closer association with the proposed European Defense Community, Royal Air Force has offered to train most of the West German air force personnel under the

progress, the British Foreign Office said yesterday.

Under the proposed European Defense Community, the Germans will be allowed to build up a 1,500-plane force, but will be limited to 60,000 men. The EDC has yet to be ratified by either the French or German parliaments. Until it is, no German forces will be created.

The British offer is designed to bring the U.K. closer to the proposed EDC. All shades of political opinion in Britain are opposed to joining EDC outright, despite great pressure from France and from the U.S. The British argue that their military commitment to the community and others makes membership a trap for a purely European army organization. At the same time the British are anxious to be "closely associated" with EDC.

Plan—In the U.K.—The offer to train future German airmen is the biggest step Britain has made yet in the direction of "European association." German pilots and their crews would attend RAF training schools. German squadrons would train with RAF wings both in the U.K. and with the RAF's 2nd Tactical Air Force in Europe.

The Foreign Office announcement said in part, "Suggestion for improving joint air force production of training facilities, related training courses, the establishment (possibly) of British officers in EDC units, the provision of tactical demonstrations, and joint unit training exercises."

To ensure the British offer extends to Germany the training and other facilities now available to all European NATO members. It is not proposed at this time that Germany become a full member of NATO, just associated with it under the EDC.



NEW LOOK AT THE PT-23 CUTLASS

Steyr's new under-hood fighter now is designed for power from two Westinghouse

160 hp engines, boosting its speed to at least 700 mph. Study of the above photograph

reveals many cockpit and what apparently are fine leather boots (fuselage).

AOPA Blames Airline Pilots in Collisions

Blame for seven night-time collisions between private and commercial aircraft was placed squarely on airline pilots last week as an editorial in the *Aircraft Owners and Pilots Association* pointed out.

Written by Max Kauke, assistant general manager of AOPA, the editorial said that "operating under the guise of 'what does not count' is what night flights between private and commercial aircraft could have been avoided if the airline pilots had been more alert."

"There is no question," the AOPA spokesman wrote, "that the highly skilled professional airline pilots were partly or wholly responsible simply because they weren't watching where they were going. Airline pilots are not using these cockpit systems nearly as much as they should."

Reporting that AOPA's 40,000 members, like others, are representatives of "aviation because,"

■ Woods Ends The writers reviewed that no airline aircraft at night appear to be conducting their business at reasonable speeds. AOPA's words reflect that each of the crash incidents was wholly the fault of private fliers.

Six collisions listed in the press picks and the accident pickup:

• Dec. 24, 1944—near Sofino, Mich. Airlines DC-3 and a Transocean. Two private planes crashed.

• Jan. 30, 1945—at Port Washington, N. Y. Avco Constellation and a Convair 140. Both men on the Convair killed.

• Aug. 19, 1948—Milwaukee, Wis. Avco DC-3 and a Convair 140. Four pilot killed.

• Nov. 27, 1951—near Ocala, Fla. Airlines DC-3 and a Piper Cub. Four pilot killed.

• June 28, 1957—at Dallas, Tex. An Avco DC-6 and a Transocean. Both occupants of the Transocean killed.

• Dec. 15, 1959—at Indianapolis, Ind. Airlines DC-3 and a Convair 170. One pilot killed.

"AOPA is aware that the volume of air traffic in large metropolitan areas is increasing," the AOPA editorial says. "An obvious fact, we think, is a good and healthy thing. That's what the whole aviation industry continues to strive for—increasing the use of airplanes for all kinds of transportation. AOPA is in the view of the people and the rest of the fact that, if you double the amount of air traffic in a given area, all pilots must be aware of that fact and keep a sharp eye out."



NEW WIDE-SET DC-3: This prop plane started on T-34 testbeding test stand.

Big New Blade for T34 Engine

The 24-in. wide blades on the new Hamilton Standard propeller designed for use with the F7D/Sopwith Petrel & Wherry T34 turboprop engine fit the voids over matched, the manufacturer assured last week.

The new wide blade prop is now completing final engineering tests. Standard prop blades have passed military acceptance ground and flight tests and parts for the new prop are in production. While 100 standard propellers produced by Hamilton Standard cost \$17,000, either one of the 24-in. experimental blades have been made.

The new prop will be installed by Navy as the new Lockheed T72-1 turboprop Super Constellation transport aircraft in the fall of 1961. Blades are of hollow steel, supported internally primarily by a steel core and a reinforced synthetic sponge filling, leaving space for support of the steel outer shell.

The extra blade width is necessary to increase the propeller's capacity to absorb power from the gearbox. It is a simpler alternative than installing additional blades in a single rotation or counter-rotating propeller combination, which otherwise might be necessary for the T34's power. However, later propellers in the same line presumably will not use blades of the same size to absorb the even higher powers anticipated up to 9,000 hp.

"In view of the fact that the engine belongs to all who fly, we think the best," the editorial continues. "It is obvious that more education and more security enforcement is needed among

propeller manufacturers for the sake of safety and economy of the aircraft in development. PRECISION By this statement I directed at the Allison T34 dual-turbine engine and the variable pitch contra-rotating propellers used on the aircraft. I also emphasize the importance of the United Aircraft turbine propeller combination.

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the very pilots who fly all other aircraft as the ones causing invasions."

An *Air Line Pilots Assn.* had no comment to make immediately on the AOPA editorial.

ATA Studies Copter Transport Potential

As Transport Asia's new helicopter committee conferred last week in Washington with representatives of the general U.S. rotary-wing industry, a second group of experts began a detailed study of the future long-distance transport potential for employment on short-haul intercity routes.

A detailed ATA specification for a transport helicopter will be drawn up specifying configuration, performance, powerplant and rotor system, and control requirements.

Other aspects of the study will include evaluation of current designs, proposal of future designs, evaluation of existing research in the rotary wing field and recommendations for additional research. The committee will also study problems involved in procurement of helicopter and fuel, wing, transport maintenance problems, and serviceable rates which are applicable to the helicopter.

In addition to the aircraft study, the committee will investigate recommendations for navigation aids, flight and operational procedures, crew training, helicopter investigation and publications, technical publications and service bulletins, accident, potential accident and traffic statistics of costs and revenue, and government participation in development of any future helicopter program.

Charles French, *Rudder* Air Lines vice president for engineering, is temporary chairman of the committee which was selected last month for the study (*AVIATION WEEK*, Jan. 26, p. 28).

Review of Plane Plant Construction Ordered

Airplane production facilities normally under construction will be reviewed by the Defense Department before March 2 to determine whether they are projects which should be considered absolutely essential.

Defense Secretary Charles E. Wilson has ordered that these review meetings be open to report on the progress of all construction that is not at least 20 percent completed.

He also followed a request from the Budget Bureau asking the Defense Department to review its operations to cut off, or restructure, any non-essential construction in order to help balance the federal budget.

Reports of the three committees will be studied by Defense to determine if any cancellation of defense industry facilities not 20 percent completed should be halted.

The review is slated to power the Convair 540



RYAN Q-2 FIREBEE glide-clad drone has been flight tested with the new

Firebee Engines

- New Fairchild J44 and Marboro power drone.
- Ryan trains officers for operational Q-2 tests.

The Q-2 Firebee, Ryan Aeromarine Corp.'s high-altitude drone, has been fitted with two types of jet engines.

While most of the Firebee flights have been with Fairchild J44s and Argus Marboro J39s, the drone also has been fitted with the Marboro J39, the jet plant developed by Vought in 1957 with manufacturing rights in the U.S. given to Continental Motors Corp.

► **J44 Power** The J44 engine is designed to embody a high degree of compactness, reliability, no droppant need, economy and training activities after entry by personnel, and economical production for expandable service.

It is rated at 1,300 lb. Thrust weight is reported as 400 lb. Length is 72 in., diameter 22 in. A single sheet metal structural structure replaces four long casting for most of the engine length. The engine is designed to operate in a transonic condition, clearly reducing the horsepower variance and also saving a substantial fraction between the two testing segments. Fairchild can control production subsystems in macroscopic setup for redesign. Mechanical parts have been held to a minimum on the J44. The ratio shaft is a light, unbalance tube.

► **Marboro Data**—The Marboro II is a 54-in.-diam. jet. It is slightly longer than 54 in. long, about 22 in. in diameter. Weight is 27 lb. It too could have been designed in longer segments, but transonic and supersonic flight is easier. The engine is a two-stage axial compressor with a two-stage reverse system (dual stage and servo system) for varying the angle to the ground. It will lower the drone automatically in the event of a target hit, or if radio wave comes from the infrared camera station, engine failure, or a command by the remote control operator.

Ryan is now testing AF and Army Ordnance allées and turbines in assembly, extraction and test capabilities of the Q-2s prepared to accomplish durability testing of the drone.



FAIRCHILD J44 (above) and Marboro II

Camera Closeups of New Cessna 180



CABIN also shows the offset seat an outstanding proficiency with eye appeal. This closeup view details the continental panel and controls and the pin rollers a small plaque of the plane's interior upholstery.



TAIL closeup of new Cessna, showing the sprung oil cooler and the fully reversible horizontal stabilizer for rolling trim.



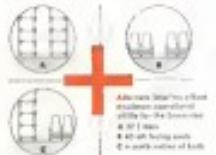
NOSE of 1960 Cessna 180 Businessman, clipp'd by a new spinner enclosing prop hub highlights the attention given to streamlining the overall design in obvious performance. The thin leading edge and well flared wing leading edge must account for 10% drag. Inside and out, the 180 also has been laid out for maximum side appeal. Trend at 112 MPH, its guaranteed cruising speed is 119 mph. Propulsion is the new 215-hp Continental 6478A six-cylinder horizontally opposed engine having a compression ratio of 7.0:1. Flying the first flight from the home Model 170, Cessna reports that all Businessman total building amounts to more than 700 planes having a dollar volume of more than \$2 million. This company with total sales of 1,360 planes last year. Late this month the company plans a mass flyover of new Model 180s.



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Hawker Theory Explains Sonic 'Bang'

- 'Boom' builds up from noise of jet aircraft.
- Bomb-blast effect can be produced by jets.

The sonic "boom" or "bang" at take-off among aeronautical phenomena that have to be reckoned with. Indeed, this high-speed flight noise is rather than academic—scientists say that under certain exceptional conditions it may produce the physical effect of a bomb blast. Moreover, complaints are made by residents of areas subjected to bangs.

Several explanations have been offered for the sonic bang, including the theory that it is caused by shock waves built up in front of the plane. The shock wave hypothesis collapses if a double bang is the reliable evidence of disturbances from both the wing, then the tail plane.

► Shock Wave Discovered—However, study of the problem, made by Hawker Aircraft, Ltd., indicates that this is not so.

The Hawker company share general radiosity interest in the problem, especially because its aerospace division, allied to a major factor in Mutual Security Agency's defense buying program, has been responsible for a good many of recent bangs.

According to Hawker analysis, the boom is a breaking or replacing wavefronts from the engine-generated shock when the plane is traveling at Mach 1.0 in pounds, whether going through or coming back, a long time ago. There is no link to the number of bangs that may be generated, the analysis concludes.

► Fading Noise Hypothesis—An interesting explanation for the "longer name" hypothesis has been proposed for Hawker by J. W. Fawcett. His explanation follows:

"Sound, as we know it, is merely a pressure disturbance of small amplitude transmitted by a wave motion in the fluid through which it moves," Fawcett says.

"Let us first consider a point source of noise moving through air at a constant speed of v . At a distance of half that of sound, r_0 , at a Mach number of 0.5 (see Fig. 2). If this sonic source is considered to be at point A it gives rise to sound and points B, C, D, E, etc., are the positions it occupied at times 1, 2, 3, 4, etc., seconds previous to the instant being considered, thus the induction noise emitted by the source when it occupied the position B, C, D, E, etc., has emitted in all directions from each of these positions in that it has at a distance of (1.5×10^3) feet away from its origin, i.e., one and a half times the distance between the source

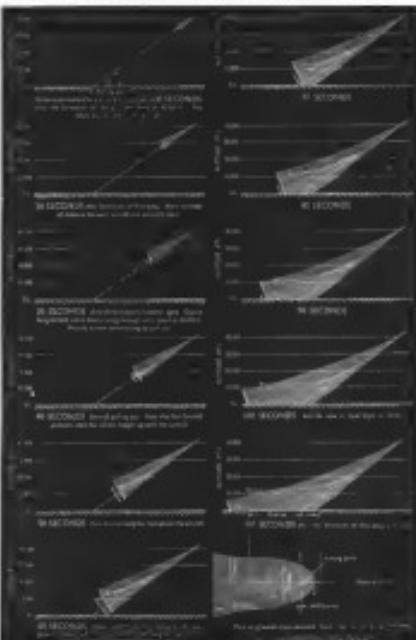


FIG. 1. Time History of a typical two-blade disc, showing pressure wave pulse.



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to move that stage in precisely A. It will be seen from the figure that the source never penetrates the screen along the direction in which the source is moving."

► Faster Than Sound—"Now let us consider the case of the source of noise moving at supersonic speed, say at a Mach number of 2.0." Fawcett continues: "Fig. 3 shows the position, at

the instant when the aircraft is at position A, if the source started when the source was at positions B, C, D, E, etc., these positions being one second apart in time, as in Fig. 2.

It will be seen from this that the actual distance traveled by the sound波 before it reaches the aircraft during the duration of its motion and that enclosing lines can be drawn which are tangent to all the circles. The radius and lines are of course sonic sections of spheres and a cone respectively, and thus one is termed the Mach cone. All the waves emitted by a body moving at sonic speed wave inwards; in this case, the angle of the cone being a function of the Mach number.

"It is obvious, then, that at some distance between A and B, for example, quoted above, the cone will intersect at one point. Such a condition occurs when the semiangle of the Mach cone is 90 degrees, i.e. at a Mach number of 1.0. At this speed the waves emitted by a body will travel with it in its direction of motion, as is demonstrated in Fig. 4.

"Thus the waves emitted by an aircraft in flight at a speed equal to that of sound will remain with the aircraft in the direction of its flight path for so long as it maintains that speed. It will, of course, maintain its speed and build up into a pressure field around the aircraft which, as far as the human eye is concerned, presents the visible characteristics of an explosion."

Pilot Disaster.—Finned air pilots usually cannot tell how is presenting a cone. "The explosive effect of the pressure wave is only apparent to a stationary observer," Finsen's analysis points out.

"As far as the pilot is concerned he is likely to be unaware of his presence when the aircraft is traveling in the nose of a cone which overtakes him, but, his speed relative to the wave will be small and then the rate of increase with respect to time will be relatively low. This is the mechanism of generation of the sonic boom."

Bomb Blast Effect.—"It follows immediately that the intensity of any given boom is a direct function of the time that the aircraft has spent traveling at sonic speed. If it were possible to fly for a prolonged period of time at sonic speed, the boom would then generate over and over again, with increasing intensity and might have physical effects equivalent also to those of bomb blast," Finsen notes.

The researcher has been advanced that because of the pressure field which builds up around the aircraft at Mach 1.0, it will be physically impossible to maintain steady flight at that speed. That amounts to the possibility that at a Mach number of unity the frost on the aircraft air-

functions at time. This, however, appears to be proved and will probably remain in doubt until such time as sonic speed is attainable at level flight."

No Any Number.—There is no theoretical limit to the number of cones, Finsen says.

Any number of cones can be generated in a single dive-spreading circular or ground reflections and previous atmospheric effects such as focusing, the waves being added as even. Fig. 5 shows a few possible specific cone cases. Fig. 5a is a normal two-cone dive where the speed of the aircraft equals that of sound at two distinct times. Fig. 5b corresponds to a case which would result in three cones and Fig. 5c is a possible history which would give four for him.

The mechanics of propagation of the cones is somewhat complicated by atmospheric conditions." The writer points out, "Due to the inverse of temperature (and hence an increase in the speed of sound) with decrease of altitude, the pressure wave will follow a curved path which is found to approximate very closely to part of a circle."

"Thus, if we consider a cone being generated in the atmosphere, it will initially follow the direction of the path through which it would have been flying while the boom was being formed, but, due to atmospheric refraction, it will subsequently curve away such that it tends to become tangential to the ground."

In other words, the boom will over-shoot the pilot's turning point. During the time that it is leveling outwards the pressure wave will, of course, expand. The semiangle of expansion of the wave being approximately 180 degrees and will increase in some atmospheric situations. The writer cautions, however, that the actual degree of expansion is small over the distances involved.

"We can visualize the whole phenomenon more clearly if we imagine that the wave, during its downward path, is contained within a hemispherical volume, the semi-angle of the cone being about 8 degrees and the curvature of its axis being a function of the altitude and the initial direction of propagation of the wave," Finsen says.

No Flight.—Finsen notes why not all flights through Mach 1.0 result in a boom on the ground.

"Fig. 6 shows three possible paths of a boom which is presented at 30,000 ft," he writes. "It will be noted that the curvature of the paths is greater for shallow angles of dive and that the ground area covered by the pressure wave is elongated in the plane of the aircraft's dive. In one of the cases shown in Fig. 6 the angle of dive is such that the wave will not contact the ground at any point along its path."

"Fig. 7 shows the paths of the pro-

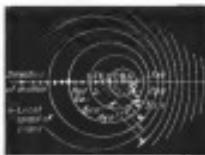


FIG. 2 Position of sound waves emitted by sound waves moving at $M = 1.0$ at instant when source is at positions A, B, C, etc., at speed one second apart.

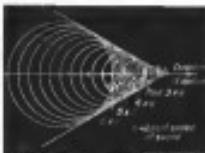


FIG. 3 Position of sound waves emitted by sound waves moving at $M = 1.0$ at instant when source is at positions A, B, C, etc., at speed one second apart.

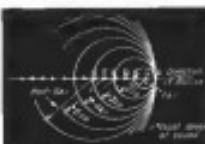


FIG. 4 Position of sound waves emitted by sound waves moving at $M = 1.0$ at instant when source is at positions A, B, C, etc., at speed one second apart.

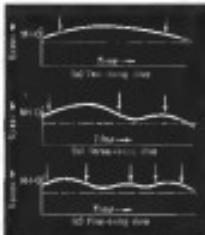


FIG. 5 Possible specific histories in case "boom" dive.

20-MONTH SERVICE RECORDS
PROVE LONGER PUMP LIFE . . .

STANDARDIZE ON SKYDROL



The charts shown here, drawn from service records compiled January 1953 through August 1955, spotlight an important operating advantage of Skydrol, Monsanto's nonflammable-type hydraulic fluid.

Skydrol's high lubricity makes possible longer pump life—outlasting that obtained with conventional petroleum-based hydraulic fluids. This is especially true in constant-duty high pressure hydraulic power transmissions.

Standard, Box 12, St. Paul 60.

REPLACEMENT RATE FOR ROTATING GROUPS IN VICKERS HYDRAULIC PUMPS ON DC-6 CABIN SUPERCHARGER TRANSMISSIONS

(in hours per year)

FAIR REPLACEMENT PUMPS

REPLACEMENT FREQUENCY		
WATER		
MOTOR OIL		
SYRUP		

Skydrol Reduced Replacement Rate by 47%

Notes were compiled at the time of completion of parts.
Analysis reviewed 241 aircraft of parts, 184 Skydrol
years, 343 motor oil and 107 Syrup years.

VARIABLE DISPLACEMENT PUMPS

REPLACEMENT FREQUENCY		
WATER		
MOTOR OIL		
SYRUP		

Skydrol Reduced Replacement Rate by 48%



DC-6 TECHNICAL PERFORMANCE: "This 20-page book lists Skydrol specifications, pump tests and laboratory test data, compatibility charts, etc. Write us for your copy. MONSANTO CHEMICAL COMPANY, Dept. CC, Chemical Division, 650 North Twelfth Street, St. Louis 5, Missouri."



How Glenn L. Martin Saved \$11,700

In fastening costs on a single contract

A recent Glenn L. Martin contract called for 3000 units with many pin-type fasteners called out for assembly. Martin's careful analysis of fastening costs provided these figures.

POTENTIAL COST SAVINGS

100 Rollpins specified for each unit

ROLLPIN VS. BOWEL PIN	\$ 6,300
ROLLPIN VS. TAPER PIN	11,700

EXPLANATION: Here's why these assembly savings are possible. The Eas-e-Rollpin is a slotted tubular steel pin with chamfered ends. It is simply driven into holes drilled to normal production tolerance, compressing as driven. It fits snuggly, and is self-locking and vibration-proof because of the constant pressure it exerts against the hole walls. No precision drilling, peening or other "extra" operations are required. Rollpin is light, reusable, and has a surprisingly high shear strength. Available in a variety of lengths, in diameters from $\frac{1}{8}$ " to $\frac{1}{2}$ ".



MAIL COUPON FOR DESIGN INFORMATION

Dpts. R39-323, Eas-e-Rollpin Corporation of America
2328 Vanderbilt Road, Union, New Jersey

Please send me the following free literature indicated:

- Rollpin catalog Here is a drawing of our product
 Eas-e-Rollpin Kit Catalog What self-locking features do you suggest?

Name _____
Firm _____
Mailing Address _____
City _____ State _____ Zip _____



FIG. 6. Diagram above, calculated for standard atmospheric conditions, shows price of present wiper produced at 30,000 ft. Wiper does not have double deflected object and present wiper is fully deflected. Wipers thus represent only the cost of distances involved.

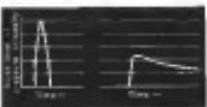


FIG. 7. Comparison of nose lift-off time and separation, Rollpin vs. Dowel Pin.

nose wiper caused on a 35-degree disc from 40,000 ft. during which the aircraft accelerates through the speed of sound at 30,000 ft. This is equivalent to 7000 ft. per second.

"If we consider just the second half of a nose Mach number of 1.0, he means 40,000 ft. and 25,000 ft., then the time interval between the wiper, as heard on the ground, will be approximately three-quarters of a second—the first being heard being the one formed at the lower altitude. This comparison of times in reverse order—(present, that is, with respect to time)—is a fundamental characteristic of progressive flight."

"If the above disc could be carried out at a nose Mach number of 1.1 (which is the upper limit reported), the times would be approximately as follows," Roiland pointed out.

"It is of interest to note that on a certain aircraft during a dive profile to the one quoted above, the pilot felt the

Safe-sealed pump aids flight of the

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toughens the Thunderjet's nose

The power-packed Thunderjet has a new nose—an ENDURO Stainless Steel air scoop cowling which makes this unit of Uncle Sam's air arm even tougher! Huge volumes of air enter the jet engine compressor through this nose ring. Dust particles impinge upon it at fantastic speeds. It is common occurrence for birds in flight to strike the ring with almost unbreakable force.

But, the new nose of tough, rugged, gleaming ENDURO now resists abrasions and tests—means safety where it counts so much.

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first-second long pass for machine to become inherent again whilst still maintaining his original line of drive. ▶ **Unusually Safe**—Although Friend sees little likelihood of long passes in future flight, many factors in it will be necessary to accomplish them once speed is able to fly in the permanent regime, he expects safety effects will be caused by aircraft flying at optimum speed.

"If we take the case of a very low level run (SRMG Show technique) at supersonic speed," Friend points out, "an observer will have nothing down the approach of the aircraft and instead it will actually pass him whilst still remaining at optimum speed."

The first instant the observer will hear will be within the Mach cone power band. This is likely to manifest itself as a sudden burst of noise, which may or may not occur under the classification of a 'bang' and this near level will be maintained, for as long as the observer is within the Mach cone, the only fading being due to normal three phase absorption and the effect of increasing distance between the observer and the source of the noise. Fig. 7 shows what the relative noise levels are likely to be if the aircraft is flying at supersonic speed at low altitude if possible."

▶ **Frost's View**—Hawker's chief test pilot, Squadron Leader Neville Duke, has surpassed the speed of sound nine times 10 to 40 times, according to his own count. Although these are taildragger and vibration in the range from Mach 0.90 to 0.95, Duke names nothing more swiftly at supersonic speeds.

"At supersonic speed there is impact with air molecules and a certain amount of heat upon the probe and no additional cockpit noise or quiet can be heard," Duke says. "I certainly do not hear any bangs I mean, although a bang tends to come earlier, although a bang tends while heat becomes supersonic has caught up with the capsule and has been felt later, on closing down. I consider an observer also when people in another capsule flying nearby hears a bang when it was struck by a bang."

During the Breguet-Duke's flight demonstration with the Hunter fighter at last year's SRMG Show, just before the generation of a number of bangs, Duke pushed the aircraft to maximum. In making the aircraft went into a load phase that were seen over when the field was obscured by clouds. This is the procedure that was followed.

On takeoff, Duke was recorded on the Farnborough radio and two feet struck a portion roughly on the lower part of Duxfield's report, at an altitude of 45,000 ft. He was held over the point at the reported height, about 45,000 ft.

When the "present" signal rises, a course rise set for Duxfield's course, just over there and back. However, at roughly a dozen miles course will sharply turn. Duxfield Then Farnborough gave a quick course to dive in.

▶ **Supersonic Test Flight**—Duke can at times find difficult occasions such as holding at Mach 1.0. He says,

"By the time the aircraft reaches regularity at approaching supersonic speed there should not be any dramatic or extremes of the kind. The test program of investigation into high Mach rates here usually consists of a progressive re-

crase in speed in level flight . . . Once again effects such as vibration, buffeting, change in aircraft control effectiveness or response, as well as others, occur at any time due to Mach waves, this may result in vibration and/or resonance, such as buffeting at Mach 1.0. He says,

"Once everything has proved to be satisfactory in level flight, a series of dives at full power and gradually increasing angles would be carried out and the Mach waves measured each time by small sensors."

Neville concludes: "A rule remains

FOR PERFORMANCE THAT MEETS EVERY "SPED"

above: Impeller Propeller Case for the SRMG Show aircraft. It is a complex casting for maximum mechanical strength. Below left: Fuel cylinder assembly for the early Hawker Hunter. Below right: The early Hawker Hunter and Breguet-Duke. They are members of the Hawker-Hawker Hunter family, which was one of the most successful and longest-lived fighter aircraft ever built.

center: Hawker Hunter Reactor, also as represented by the aircraft above. It is a complex casting for maximum mechanical strength. Below right: Fuel cylinder assembly for the early Hawker Hunter. They are members of the Hawker-Hawker Hunter family, which was one of the most successful and longest-lived fighter aircraft ever built.

right: Impeller Propeller Case for the SRMG Show aircraft. It is a complex casting for maximum mechanical strength. Below left: Fuel cylinder assembly for the early Hawker Hunter. Below right: The early Hawker Hunter and Breguet-Duke. They are members of the Hawker-Hawker Hunter family, which was one of the most successful and longest-lived fighter aircraft ever built.

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it is passed closer and closer the latter one pushes the aircraft, although obviously one must strike a balance between push and direction. Only the pilot can decide whether or not to protect and increase speed further if angles such as bullet arc permit, depending on the degree of violence or safety preferred."

**Spacemen Study
Universe Remodeling**

The problem of stabilizing the course and of landing on various planets caused top leaders at the recent London meeting of the British Interplanetary Society.

R. A. Smith, a designer at the Government Rocket Propulsion Department at Wernher, spoke on "Landing on Asteroid Planets," and E. Hope-Jones, a civil engineer, lectured on "Planetary Exploration."

Improving the Universe-Hope Jones considered the possibilities of affecting the motion of the solar system.

[Editor's Note: Hope-Jones was possibly thinking of a proposal made by Dr. Fritz Zwicky of the California Institute of Technology. Zwicky has suggested the modification of the universe as a possible means of extending living conditions on certain of the planets, including earth.]

An example of the former involved, Hope-Jones said, that a cubic mile of rock would fall at 50 miles per second and, hitting the motor, immediately would only increase the rate of rotation of the moon by one revolution in 52,000 years.

If this same mass struck vertically, the stated velocity would be about three feet per day, and that would have a negligible effect on the orbit. These suggestions for altering the solar system were not the only pipe dreams, Hope-Jones concluded.

One of the more important tasks of the engineers would be the provision of power on other bodies in our solar system. Nuclear power is not necessarily the answer, said Hope-Jones. Solar power would be much more reliable on the inner planets and on satellites whose surfaces were not obscured by clouds. Hydroelectric and wind power would also be important on other planets.

Landing, Verner-Sorenson pointed out, the first step would be an ascent velocity, and that such a technique would probably be the top step of an orbital rocket without wings.

Such a craft should be designed fairly high-gauge, to 9G and, therefore, would be suited to vertical landing, which appears to be the only practical method of bringing the ship down. Due to the lack of atmosphere, there would be no air damping forces present



Stabilizing of the vehicle would best be accomplished by means of auxiliary jets, probably three in number, he said.

Stability of the vehicle after landing could be handled by four landing legs placed as far outboard as possible. These legs would have built-in shock absorbers that would require a stroke of about six feet in order to take a 10G deceleration. The many absorption of such a landing gear would be equivalent to a drop from 360 ft. onto the moon surface.

For reasons of stability, the vehicle should be short and broad as possible in order to obtain a low portion of its center of gravity.

• Landing Approach—Once below, you could land you would have to make an approach. The question was in the direct radial approach, and under certain circumstances this approach was the least bad. But the orbital technique is not so critical and therefore less dangerous, said Smith.

The spiraling would not put strain on the vehicle, and an addition of velocity would be automatically generated by doing this, the relative position and location of the vehicle with respect to the moon could be very conveniently isolated, and exact impact could be applied to bring the ship to rest at a certain altitude above the chosen landing point.

**Plane Icing Course
At U. of Michigan**

The first academic course on airplane icing will be held at the University of Michigan, Ann Arbor, from May 30 to Aug. 5.

The course will feature lectures by 13 experts in the field, including special guest from Grumman and Fairchild, and will cover the basic phenomena of icing in

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well as the various deicing systems now in use or proposed. The contract is open ended to the Secretary of Defense's Department of Aerospace Engineering and the Extension Service, in cooperation with USAP. The university is grateful to the many organizations for the Air Force's support.

A clear understanding of the aviation industry will be maintained after the course is completed.

The first subcommittee is available from Marlow B. Small, Supervisor of Institute Executive Service, 4501 Administration Building, University of Michigan, Ann Arbor, Mich.

F2H Parts Tested in New Altitude Chamber

The functional problems of equipment operation under the extreme conditions of today's flight regime will be studied in a new altitude environmental test chamber recently completed at the McDonnell Aircraft Corp., St. Louis Components at the F2H-2 Number, McDonnell's production Navy fighter, has been through the chamber steadily. The laboratory unit, which McDonnell still has in the largest of the U.S., will simulate altitudes up to 70,000 ft. Incorporating among the chamber features is 100°F to 165°F. Construction begins in the spring of 1953.

• That is One—These are three prototype chambers in this unit—which McDonnell calls the Altimeter—so that calibration can conduct several tests at the same time. The main chamber is 2 ft. long, 11 ft. wide, and 9 ft. high. It can be ranged into a smaller chamber only 3 ft. long for tests on larger aircraft parts.

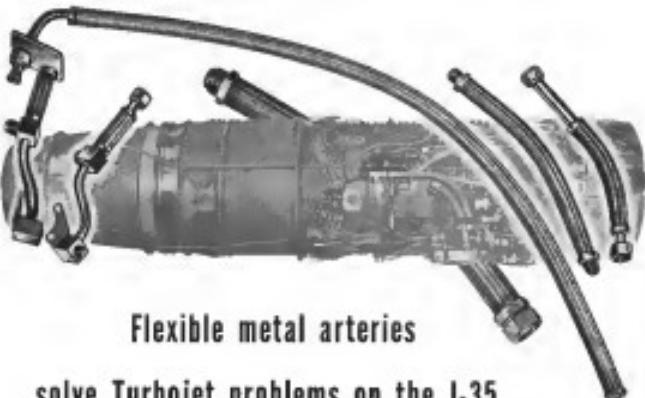
The third chamber is considerably smaller, about the size of an average home income unit. This is used as an air lock to the main chamber for personnel, small objects, and tools. It is also available for small tools which could not be air transported in the large unit.

Parts of the Altimeter which have been tested in the chamber include the still vacuum, shock absorber, the pilot's heatcoat, valves, instruments and controls, and others.

To obtain initial results of the chamber it is to be tested at a future date. To accomplish this, an end wall of the chamber will be pulled aside and the entire vertical height in.

Remote instrumentation is built into the chamber, remote handling, and power sources inside of the chamber are being planned.

Although normally intended for unrefined altitude levels of 70,000 ft., strength tests made on the chamber have actually reached the 100,000 ft. mark.



Flexible metal arteries

solve Turbojet problems on the J-35

One of the primary problems in developing the J-35 for production was the development of fuel, oil and air lines to meet today's jet engine requirements. The metal hose had to meet complex configurations of a critical nature and still withstand massive changes of temperature, high pressures, and unusual vibrations. Other important considerations were slow installation-time and speed of installation.

Rigid tubing was unsatisfactory; configuration couldn't be predicted on the drawing board; hose production was difficult, maintenance costly and complicated.

Because of the intricate nature of the problem, the metal hose had to be assembled in mock-up form. This required flexible-hose engineers, a competent experimental shop, and advanced knowledge of

aviation metal hose requirements

Titeflex designers found the help and the metal hose they needed at Titeflex.

Our long experience with ignition shielding, fuel and oil lines and other aircraft applications enables us to design and construct flexible metal hose and fittings that meet the toughest jet requirements. (In fact, Titeflex was one of the first to qualify in the field.)

Today, Titeflex handles a majority of flexible metal hose assemblies for jets. Titeflex research continues to develop new designs of metal hose to take care of the higher temperatures, pressures, and new applications in the jet planes of tomorrow. Our experience and many of our techniques also apply to non-aviation problems. Perhaps yours is one of them. Write or phone us today.

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the laws of motion



NEWTON

N ewton's laws of motion describe the basic dynamic features of instruments that measure rapidly varying physical phenomena. Standard transducers are available for the measurement of acceleration, position, force and displacement. The transducer element, converting mechanical input to electrical output, provides the means whereby standard instruments achieve necessary unity during dynamic measurements.

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IAS Summaries

Papers on rocket propulsion and aircraft dynamics presented at the 21st annual meeting of the Institute of the Aeronautical Sciences are summarized on the following pages.

The summaries continue a series begun three years ago on the IAS meeting. Others will be printed as we early issue.

Electronics in Aviation

(Program Arranged in Cooperative with the Institute of Radio Engineers, Institute of Navigation, and Space and Technical Committee for Aerodynamics)

Adaptability of Electronics to Aerospace Control

Jed D. Pfeiffer and Robert W. Curran, Republic Products Div., Boeing Company Corp.

A review of simplifying the task of aircraft control by using electronic computers is presented. Aircraft systems developed for use in a single stage engine control system, that method utilizes electronics and servo principles that can be adapted to a variety of engine controls for use as single or dual stage engines, the use of a transduced control signal, and the use of transduced control and pulse widths, is described in detail and is feasibility demonstrated.

Solenoid Cooling of Air-Borne Electronic Equipment

Walter E. Strohmeier, Research Department, Mechanical Engineering, The Ohio State University.

In electronic cooling, electronic units should have conductive film connections and defined thermal characteristics while some other temperature rise of basic components is acceptable. This is a major effort in aircraft performance; cooling methods should handle most aerospace environmental temperature gradients.

If possible, few of the electronic cooling coil electronic component surfaces is thermally most active.

Otherwise, due to more massive fluids, such as liquid water/methane refrigerants, may be explored.

In design of closed units the heat removal problem can be solved using cooling methods to be employed at the lowest cost. These are forced air or liquid flow, natural liquid convection or liquid spray (with or without heating), and conduction to external cooling medium.

A comparison of a couple of the physical characteristics and cooling power requirements of units having the same electrical performance but different configurations suitable for application of these methods.

Dimensional Ultra-High Frequency Acoustic Systems for Aircraft

M. S. Sheld, Rader and Compton Dept., and J. J. Ned and A. C. Kreslins, Federal Telecommunications Lab.

The paper describes an investigation that has been conducted to determine the value to the problem of obtaining non-directional coverage from coherent operating in the 1,000-1,500-mc frequency band on large aircraft. Model pattern measurements were taken on several types of aircraft to determine the limitation of trivial angle subtense

size. No one set found which produced sufficiently good coverage to satisfy most of the requirements. Dimensional and $\pm 15^\circ$ of azimuth angles and $\pm 15^\circ$ in elevation angles.

On a related performance basis, half an hour was spent on the choice of the best antenna height for the aircraft. The top of the fuselage over the wing root was the second best site, and the top of the vertical stabilizer was the poorest site considered. These constraints were satisfied using 3/8 and 1/4 wavelength of a DGS at a 1/16 scale model of an XB-52, considering power in space at all azimuth angles and $\pm 15^\circ$ in elevation of equal importance.

Some a simple antenna was not enough, since no possible solution involving dipole antennas was considered. The required dipole antenna for DMSF consists of two radiators with complementary coverage, one located on top of the fuselage and one other located on the tail connected to the DMSF equipment through a switch. One dipole is fed with a 1/2 wavelength feed, the other with a quarter wavelength feed, and the two are fed in phase quadrature. Loss of the unused signal underway.

The proposed dual antenna system for DMSF consists of two transversal radiators located on the same side of the aircraft. The top dipole is used for low altitude and low speed flight, and the bottom dipole for high altitude and high speed flight. Both radiators are directly applicable to a helicopter, with its vertical flight and relative to a simple form depending only upon the rotational Mach number at the outer tip. It is also possible to use the top dipole for high altitude flight if the top Mach number less than 0.5, it may be obtained by using the simple Friend/Cleant cone form with the Mach number given by the rotational speed at the outer tip. However, at the higher values of the Mach number, the dipole becomes inadequate and the complementary effect is potential.

The desired complementary constraint is assumed to be in matched agreement with available experimental data.

Aviation Medicine

Trauma and Traumatism in Aerospace Vehicles with a View toward the Next Ten Years

Erik G. Ode, Dr. Olof Söderström, J. USAF, School of Aviation Medicine.

The general prediction is made of civil air transport at reduced speed and altitude up to approximately 50,000 ft, with total weight in take-off of 100,000 lb and at speeds of 2,000 mph. This air flow will have these human problems that the most advanced military flying code today, while the military is in the process of developing a new flying code, will allow many critical problems clumped about the consideration of reduced crew protection accomplishment.

Physiological Agents of Fatigued Flight at High Altitude and Low Temperature

John H. Lutz, Dr. George J. Lutz, USAF, School of Aviation Medicine.

Long-duration flights at high altitude impose increasing demands on mental capacity and motivation, and to prevent undesirable fatigue effects the occupant must remain capable but also to maintain a minimum of safety in emergencies. Mental conditions from a physiological point of view would apply similarly to the human system under the assault with respect to metabolic processes, general homeostasis, temperature, humidity, and radiation in the cabin.

Fewer knowledge of human limitations

leads to increased or longer fatigued flight times.

Silentium Compressibility Corrections for Propellers and Helicopters Rotors

S. M. Landau, Assoc. Prof. of Mechanical Eng., and L. S. Teller, Assoc. Prof. of Mech. Eng., LAPCO, University of California at Berkeley.

Through the application of linearized theory, a compressibility correction is obtained which gives the thrust or torque to account for the effect of the wind tunnel flow on the forces on a helicopter rotor from the main possible flow rates.

The blade compressibility correction is applied to the airframe flow by superimposing the linearized compressibility corrections, while the first order compressibility effect on the airframe is obtained from the simple inviscid theory.

The blade compressibility correction for the propeller is based to be expressed as 10% of the propeller shaft Mach number and 10% of the wind tunnel Mach number. The total speed of the propeller is constant. These solutions are directly applicable to a helicopter with its vertical flight and relative to a simple form depending only upon the rotational Mach number at the outer tip. It is also possible to use the top dipole for high altitude flight if the top Mach number less than 0.5, it may be obtained by using the simple Friend/Cleant cone form with the Mach number given by the rotational speed at the outer tip. However, at the higher values of the Mach number, the dipole becomes inadequate and the complementary effect is potential.

The desired compressibility constraint is assumed to be in matched agreement with available experimental data.

and the wings of biological adaptability per unit tissue compression to favor an air craft design and operational efficiency. In the event of sudden loss of cabin pressure, protection of the human body is to reduce the amount of gas expansion in the body and mitigate the effects of acute lack of oxygen until safe altitude is attained.

Aeromagnetic Characteristics of Geomagnetic Influence in Aviation of the Next Decade

Col. Paul A. Campbell, USAF, School of Aviation Medicine.

The degree of influence for this discussion is established by the prediction that the influence of the geomagnetic field will increase to densities as high as 50,000 nT in profitably flight to 1980-1985. This presents two obvious atmospheric phenomena to relate to those changes. The atmosphere is characterized to obtain the influence of density pressure, however, the problems are understood. With the present exception of heavy pressure values all tend themselves to addition.

Vibration at High Speed and High Altitude

Col. Verne A. Farnum, USAF, School of Aviation Medicine.

There are many factors in the use of the air which will require consideration as the next 10 years. Of these theories, the aeroelastic and aeroacoustic theories are the most important, while the aerodynamic and aerothermodynamic are important in the development of the individual's ability to live and work from the standpoint of the well-being of his eyes.

A second factor will be the delay in the

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THE AEROTEC CORPORATION

AIRCRAFT DIVISION

Design and Manufacture of Aviation Controls for: Bombers, Transport, Jet and Propeller Aircraft—Passenger, Business, Cargo, Airtank, Deliveries and Abstaince Types—Flight Simulators. This list does not include: Single Deck or Transport

most important mechanism of the human being. The driver is relatively independent under ordinary circumstances, but under really tough speeds it can be extremely important.

► The Problem of Noise at Air Transport and in Ground Operation. Lt Col James E. Lee, USAF School of Aviation Medicine

Jet noise shares a spectrum quite different from the conventional aircraft noise. Called "white noise," its total energy content is greater than the spectrum of noise whose frequency components are at the same income the potential for damage to the ear but model shielding within the aircraft was ineffective. The principal problem concerns protection personnel.

In addition to "protective measures" to the ear, noise has other and more general effects. Maintenance effectiveness can fall off in noisy environments. Workers will be helped by wearing protective devices and having repeated hearing checks and sign language interpretation. Care must be taken, location and operating procedures will protect other people involved.

► Aeromedical Problems for Nuclear-Powered Aircraft. Lt Col John F. Fadlow, USAF School of Aviation Medicine

Possibility of protection from static power has been argued for several years. If one accepts the solution need to fly half way around the world and return, safety, reliability, and cost factors must be considered. Nuclear propulsion for aircraft presents many engineering and design problems. However, model resolution also reveals a series of medical problems resulting from the power plant of more specificity, from the nature of the power plant associated with the removal of the power plant.

These problems and many others have initiated a widespread biological research program associated with nuclear propulsion.

► Crash Protection in Air Transport. Lt Col John F. Stapp, Aero Medical Lab, WADC

Tolerance and survival time to crash-type forces have been explored by exposing test subjects to controlled force decelerations in various positions and rates.

The rate of change of accelerations in G per unit optical derivative of instant deceleration significantly influences and no real value. MAG peak deceleration. Total area of the deceleration curve, after application of load equivalents on body, and topology of configuration of protective bar are decisive degree of protection for all but low facing positions. Application of deceleration research to an transport problem is discussed. The problem of protection of safety net for marshalling carts is described.

► Impact of Modern Avionics on Health. Lt Col Harold V. Ellington, USAF School of Aviation Medicine

Modern developments in air transportation that are exerting effects on health. On land, increasing speeds of travel and expanding networks of air lines lead to serious certain health hazards. Air travel may include the spread of some communicable diseases and bacterial agents. New occupational health hazards are being encountered.

On the other hand, air transportation is

stimulating the improvement of health. Considerations on international air routes are establishing new standards of health protection in order to facilitate air travel. Air transportation extends the services of great medical centers into remote areas.

Motorless Flight

► Flight Observations of Sectionalized Boundary Layers. Bruce H. Cernyak, Aerodynamics Dept., Michigan State College

A series of wind tunnel tests on a sectioned model show a decrease in the coefficient of friction distributed over the profile and length of aircraft wing profiles for constant boundary layer stratification and parameter distributions of the economy of flight distributed over the profile. The maximum cruise speeds are given as well as the influence on other performance parameters.

Detailed discussions of the nature of the boundary layer stabilized by suction indicate various pressure gradients are presented along with a summary of the results being reported. Some basic recommendations are offered on construction methods and structural features compatible with the results.

► Shearflow Compensation of Performance Skin Surfaces with Other Means of Electric Boundary Layer Control. By Section: Charles D. Clegg, Aerodynamics Dept., Michigan State College

The results of a series of studies to determine the optimum boundary layer control sheet materials which could be laid on a series of electric boundary layer control by curves, are presented. These results include the ultimate tensile and shear strengths of various laminated polymers and of powdered 218T in a diamond pattern, and the fatigue life-span of such thin layered sheet-moonshot-alloy sheet.

Transport Safety

► Coax Protection in Air Transport. Lt Col John F. Stapp, Aero Medical Lab, WADC

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AVIATION WEEK, February 21, 1963

POWER

BLADES



FOR JET ENGINES

MASS PRODUCED with the aid of...

microcast



Turbine type jet engine units develop "peak" with the aid of hundreds of tiny power blades and buckets. These parts are made of high-temperature alloys by the Microcast Process. This mass production technique solves the problem of handling the heat, virtually non-machinable alloys required for jet power plants at substantial savings. The flexibility and economy in producing high-heat alloy parts can be put to work for you. Let us show you how precision cast parts can fit into your product's design. Write for 16 page booklet and information on the new MICROCAST color movie.



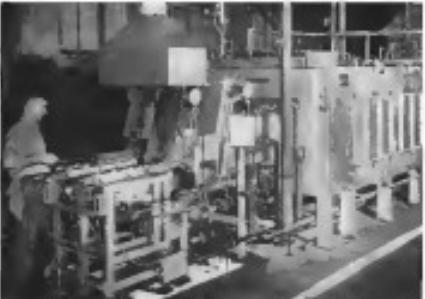
MICROCAST DIVISION

AEROTEC LABORATORIES, INC.
601 West 31st Street, New York 10011
300 South Michigan Avenue, Chicago 3, Illinois

PRODUCTION



1. MOLDING and entering jet compressor blades made of Thompson Products' new cermets material in a powder process similar to the sintering method, illustrated in the picture above.



2. COINING worker compresses the blades in a hydraulic press, giving them additional strength after sintering and adding root and corner



3. COPPER without pellets no place on blade ends.



4. INFILTRATION with copper alloy at 3,000°F, giving blades 180% density



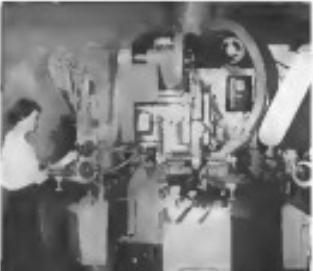
5. SOLUTION heat treatment in an oil quench is made for additional blade strength



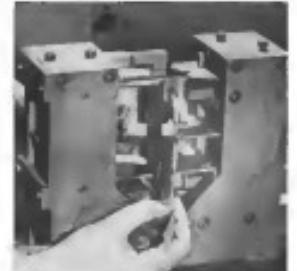
6. STRAIGHTENING restores twist and warps



7. PRECIPITATION hardening at low temperature provides high strength



8. MICROPOLISH puts perfect plating surface on the jet compressor blade.



9. INSPECTION of blade is made on a profilometer gauge and by X-ray.

Cermets May Help Jets Operate Hotter

Checklist—A new ceramic-titanium metal material being developed here at Thompson Products' Tapco plant promises to be a highly useful material in the design and operation of jet engines.

Should development work on the titanium-cobalt metal project prove successful, engine combustion temperatures 200-300 deg hotter than those conceivable with other now in use may be attained. This temperature increase

would promote greater engine efficiency.

► More Details—The particular application of the new material would be in properly matching turbine buckets and wheels—a feat impossible with previous cermets because of their low ductility.

The new cermets has a hardness almost equal to that of glass—about 90 Rockwell A or 680 Brinell—but it can easily be heat treated through a 20-degree arc if the metal is given enough, a 90 deg bend is possible.

► Shutter-Resistant—One big advantage claimed for the new cermets buckets is

Thompson experts are reported to "show excellent physical properties superior to any monolithic of our knowledge."

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► Shutter-Resistant—One big advantage claimed for the new cermets buckets is

protection for jet engines against damage caused by ingestion of foreign matter. Previous little concern because birds seldom struck aircraft by the nose and surfaces covered by the engine but the titanium carbide compound is used to heat overcoats successfully that difficulty.

In another endeavor by Thompson, small-area (22- and 32-cell) fan usually mounted off in the sides and held to damage simple parts.

A powder process similar to the powder welding method is employed in manufacture of the titanium carbide shapes. The powder is compacted, an-

teed and then sintered with a metal not identified by Thompson officials. The guitars on their page show how Thompson has been making powdered metal valves and valves made. Last mentioned figure for this high production included a titanium engine of 250,000 lb. (Aviation Week Sept. 17, 1951, p. 50).

The price of bacteria aside by the new process will be comparable to those now in production, say company officials, when the new type attains full production. At its early stage the new process may be suitable at an increase of 25% over present types.—GLC

Stainless Tube Made With Glass Lubricant

An extreme process using glass as the lubricant medium has been demonstrated in a group of government defense contractors, particularly Defense Production Authority, Marquette Board and the Armed Forces where a stainless steel tubing extrusion has cost about \$1,500 for lower hydropress operated under the French Usine Seigneur glass lubrication method. Extruded lengths of 30-50 ft. were run off.

The show was held at Beloit & Wilson's Tubular Products Division, Beloit Falls, Wis., and was sponsored by Loray Corporation Co., Inc.

Slant Tool Setup Saves Floor Space

More floor space has been节约ed at Bob Aircraft Corp.'s Clinton, Vt., plant by setting a lathe at an angle instead of a 90-deg. angle to the wall.

Bob feels the arrangement gives about 50% more usable floor area. The sheet metal part can now be held to the headstock and handle bars, while formerly an overhead crane had to do the job.

Consequently the angle lathe, which sits atop of hammer-like monolithic stone top tablet. Evidently these tools took up floor space adjacent to the lathes.



DIALING NUMBERS

Das printing of 816-type telephone has been completed and completed. Westinghouse AP-1 Brake Valve, which appears in the catalog, is a mechanical device which permits a maximum pressure whereby the degree of pressure or automatically increased against overpressure or pressure drop in the braking system.

ANAVATION WEEK, February 22, 1951

Radio Speeds Douglas Operations

Radios are speeding heavy landing gear at Douglas Aircraft Co.'s El Segundo Division. Two-way, low-power radio units which have been used for departing personnel for the movement of aircraft between storage areas and drop-hazardous areas have proved so effective that the company is expanding their application.

In the deplaning operation, drop-hazardous places a dispatcher who makes the request to the controller operator. Leader is moved to the dispatcher, picks up the old file for return to the 5-star storage area, then moves the new unit back to the hanger area. This eliminates the need to wait opposite from the dispatcher or the hanger area to find the plane.

Douglas is equipping 30 airplanes with two-way communication of this type over the entire 181 miles of the plant.

Two-way radios are also being installed as equipment for each recovery aircraft in the company's highway patrols and consist of 40 mobile transmitters per vehicle within a radius of 50 mi.

Eutectic Contest

Rules have been announced for the Eutectic Welding Alloy Corp.'s \$1,000 prize contest for "Creative Ideas in the Science and Art of New Eutectic Welding, Braising and Soldering" and may be obtained by writing to the company's Dept. P, 152nd St., Northern Blvd., Flushing 55, New York, N. Y.

Contest is open to engineers, metallurgists, research investigation, welders, students, faculty members and all others qualified. The deadline for entries is Aug. 31.

PRODUCTION BRIEFING

• Crowley Aircraft Supply Co., Inc., White Plains, N. Y., has entered the AN hydraulic fitting field as manufacturer and will produce to stock and special orders. Presently the company acts as distributor for manufacturers of hydraulic fittings and has determined this plant to enter the production end.

• Aerospac Corp., Joliet, Ill., has acquired Sigma Off Sets & Guards, Birmingham, England, a license to make and sell Aerospac best fittings and bushings manufactured in Great Britain, Australia, New Zealand and South Africa—including use of Aerospac pattern, sizes and trademarks.

• Alumiteal Distribution, Inc., Chicago, has been granted distribution of Reynolds Metal Co. products and is

engaged in finding less-expensive items in various categories.

• Marquell, Maxwell & Moore, Inc., has formed a separate division to design, develop and produce aircraft instruments. The firm has been handling aircraft instrumentation since 1948. Location of the new division is at St. Louis, Mo.

• Pratt & Whitney Aircraft Division, East Hartford, Conn., has doubled employment and production since late 1949 and expects to add 5,000 more employees during the next few months. Approximately 90%

of the horsepower delivered by PWAs in 1951 will be jet, according to general manager William P. O'Brien.

• Hydro-Air, Inc., which recently opened a new plant and general offices at 1830 Wrenn Ave., Franklin, Calif., has expanded into the helicopter-machinery field.

• Rend Engineering Corp., Los Angeles, is producing a new dielectric former for use in resistor starters. The corporation's Industrial Division recently was expanded for manufacture of both dielectric and induction heating gear.



Sturdy Tubing for Landing Gear

When aircraft designers come to a problem where dependability and strength are a requirement they turn to steel tubing. From the pieces of yesterday to today's modern aircraft the increasing demand is for steel tube for the heavy responsibility of landing gear, engine mounts and all other points of stress. When your requirements call for steel tubing, look to Service Steel for a dependable source of supply. Whether large or small, from warehouse or mill—your orders are always shipped as schedule. For a complete list of our aircraft tube stock write, wire or phone us.

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VAN PELT CORP.

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DETROIT 7, MICH.
200 BROADWAY STREET
LOS ANGELES 12, CALIF.

So little in weight...

so big in
BRAKING
SAFETY!

Westinghouse
AP-1
Brake Valve
Operating pressure:
2000 psi
Peak pressure:
4500 psi
Brake pressure:
7200 psi
Weight: 1 lb.



Just a pound of pressure is enough to stop a 10,000-lb. aircraft in 100' operation and protection of aircraft passengers. The Westinghouse AP-1 Brake Valve weighing no more than a pound—permits control of any degree of braking pressure—conduciveness without safety considerations.

The Westinghouse AP-1 Brake Valve permits application of a constant pressure—in response with

ACROSS SECTION
WESTINGHOUSE
AIR BRAKE COMPANY
WILMINGTON, DELAWARE
INDUSTRIAL PRODUCTS DIVISION





METAL-BOUND FRAGMENTS were used to 5,000 mg. g⁻¹ of silica membranes to cover 2000 and 3000 external surfaces.

Convair Pushes Metal Adhesive Studies



PRODUCTION LINE at Daewoo's Fort Worth Division where model patterns of 8-36 skin are joined with osseous and special adhesive tape.



WAVFILE 12.00018K7208 shown in Fig. 1 was taken this morning

- Program investigates use of Metibond and FM-45.
 - Supersonic temperature problems to be checked.

Product improvements and extension of use of metal adhesives are the project of studies being pushed at Consolidated Vultee Aircraft Corp's Fort Worth Division under Air Force contract.

Two types of adhesives are being used in this development program:

- **Metbond film**, a tough **Coumarin**-relaxed adhesive containing rubber, was selected because of the large amount of data Coumarin has generated through its use in **AB 3G** production.

* FM-49 resin-type adhesive, a product of Blomusagle Rubber Co., Chester, Pa.

In the past as the standard for testing. Data also will be accumulated on use with temperature alloy.

► **Other Considerations**—The investigation may be extended to some problems involving elevated temperatures resulting from supersonic flight. This will require the use of adhesives with high temperature projection better than those at Matlock fillets at 400°F.

Corviro is now competing with adhesives manufacturers in an attempt to develop a high-temperature-resistant adhesive with good production characteristics. Present Mettstab adhesives are limited in their effective use to a maximum temperature of about 180°F while under load. All the higher speeds expected to be encountered in the manufacture, bonding results improve as higher temperatures will undoubtedly be required in certain areas, Corviro says.

(Also contributed to some work with)

sandwich type construction, using a glass-fiber base coat and metal surface plating.

Two Adhesive—Developed by Clegg, McLeod was conceived as a weight-saving device, allowing use of thinner skin than required by the more conventional construction. (American Water Works June 19, 1938, p. 20). It also was noted that the metal adhesive strengthened surrounding materials.

Coumarin developed several of the adhesives. Two of these, designated MEC and ND, were outstanding. Excellent results were obtained by a combination of these two cements. MNK2 tape, a dry Elga adhesive containing separate layers of the two materials, was found to be particularly effective from a production standpoint. Coumarin claims it possesses both strength and flexibility.

Establishes Bond To the metal series, NL2, a low pressure adhesive, is thermoplastic prior to cure, equalizing pressures by filling small imperfections resulting from imperfectly machined parts or impacted parts.

Reinforcement Post-Welds—the process has been improved, Clauvin's unit at Marbois has greatly expanded. Early in 1959, Clauvin recognized further advantages of metal adhesives in aircraft construction through experience with pencils on the B-52 center panel tanking

The men had failed to be particularly acceptable to fangs, falcons assailing from vibration from the men goes with paper traps. The pencil wad that was attached with metal adhesive, even though made with thin magnesium skin, were among the parts that did not fail after a few hundred hours of testing.

As a result, other peach were made at this station when pots were adequately protected against the ravages of the greatly increased number of

It also seems that use in true primary industries would improve both knowledge of design systems and improved control of production practice.

B-35 Applications—Although many potential applications for metal adhesives exist in aircraft construction, present use on the B-35 is confined to that class. It has been found that there can be reduced to a minimum and bonding materials through the adhesives process for a smooth exterior surface.

Approximately 5,600 sq. ft.—about 25%—of the B-15's 20,000 sq. ft. of exposed surface is covered with reinforced skin assemblies (blasted with the Methanol process). Specifically no unjoined parts of the B-15 can Methanol Applications on the aircraft WB-60 set

**CANNON
PLUG ACCESSORIES**



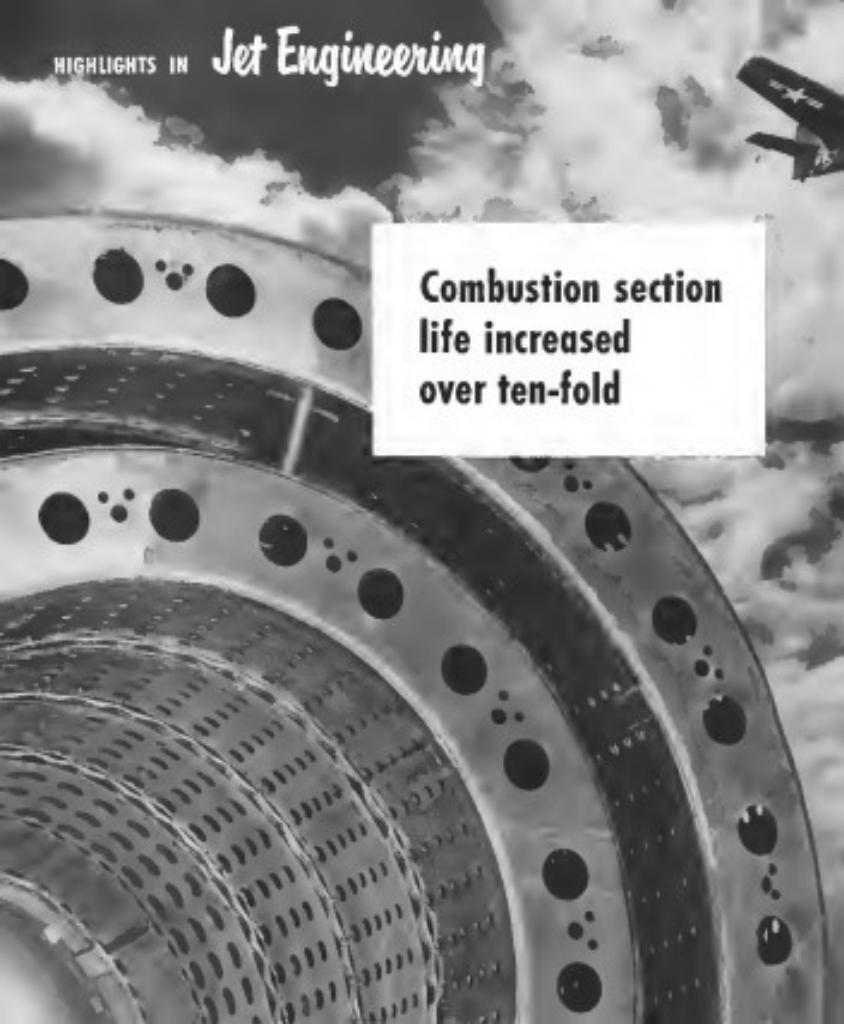
Here is the answer to a frequent question we receive from people everywhere. Yes, Canon does make a complete line of cameras to be used in conjunction with the AN Series of projectors. Complete engineering data on each of those is given in the Canon AN Bulletin, available on request.

CANNON ELECTRIC

Since 1975

Matthew is Lee Argoff, Dennis, New Haven. Steven Hodson says: "Matthew is probably still alive. Address unknown to Common Sense Magazine. Sept 1-16 21 22 West 73, Lincoln Heights, Bureau, Los Angeles 24, California.

HIGHLIGHTS IN Jet Engineering



Combustion section
life increased
over ten-fold

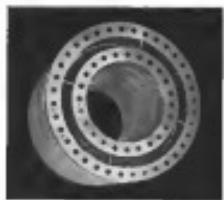


The combustion section of jet engines has posed an unprecedented load on service life with the introduction of the "step wall" liner. The unique design of this combustion chamber liner has proved itself beyond question in the unanticipated combat record of the Westinghouse J34 engine. By eliminating severe hot spots and their heavy engine damage, the liner answered one of the most critical of all service-life problems.

The aerofoil design features of the "step wall" liner, a Westinghouse patent, stand out at a glance. In place of the usual cylindrical sheet metal construction, telescopic cylinder sections have been fitted together. This gives the liner a stepped contour, instead of a flat surface, allowing a continuous blanket of relatively cool air to pass over its surfaces. The result: protection from the ravages of temperatures over 3000°F.

While the J34 was setting its unparallelled combat records in Korea, Westinghouse engineers were developing another new jet engine, using the "step wall" liner—the J46. Already never altitude and wind-tunnel tests have been made. Again new records have been set . . . over 700 hours without a major component change. And again Westinghouse engineers have new designs on their drawing boards . . . new plans to keep advancing the jet engineering of today, with an eye to future, more economical air transportation tomorrow. Westinghouse Electric Corporation, P. O. Box 610, Pittsburgh 30, Pennsylvania.

24603



"Step Wall" Liner—Full view of combustion chamber liner shows stepped contour design in both inside and outside sections.

YOU CAN BE SURE...IF IT'S
Westinghouse



AVIONICS

GE Capacitor Is Small but Rugged

Avionics goal of reliability, decreased size should be aided by new line; size saving averages 20%.

Bethel Falls, N. Y.—Avionics designers, who've made progress in making their capacitor smaller and more reliable, should get a helping hand from a new line of soft-temperature-range capacitors developed by General Electric's Capacitor Dept., here.

The new cylindrical, hermetically sealed tubular capacitors are:

- **Smaller.** They are reported to average 20% smaller than comparable oil-filled units.

- **More rugged.** They use an extremely thin aluminum bonding material of the single-gloss red seal previously used in triplex capacitors.

The capacitors will come in standard 100-, 200-, 400- and 600-mfd ratings, in the range of 4,000 to 1 mfd. GE says that sample quantities will be available in April.

First public showing of the new line will be made at the Institute of Radio Engineers Convention in New York, May 23-26.

► **Filling a Void.**—The new line fills a void existing but unmet until when the Armed Services Electro Standards Agency (ASESA) decided to drop Characteristics 7 and 8 of capacitors from proposed MIL-C-25 capacitor specification. This action eliminated from specified capacitors' reported lack of stability at extreme temperatures (−55°C and +55°C).

Equipment that was being designed for operation in the −55°C to +55°C range had to have qualified capacitors replaced with MIL-C-25. One "B" presented MIL capacitors because of their lower dielectric constant than some, thus causing a reduction about 10% larger than the C-25 rates.

► **New Type Proposed.**—Pyrax, the liquid dielectric used in GE's monolithic capacitors line, is in many ways, better dielectric than mineral oil, except at extremely low temperatures. GE's efforts went to work and came up with a new type of Pyrax which maintains its dielectric quality (insulation) from 15°C to +55°C within the 15% allowed by MIL-C-25.

The result is a capacitor that meets the performance spec of Char. E, but is as small as or smaller than the standard Char. B.

Large capacitance-value units in the new line fit in much as 30% smaller than comparable mineral oil capacitor, GE says. The overall savings decrease



TYRAX CAPACITATOR series −55C to 55C temperature range for oil-filled and wet in 20% smaller. Wet out, the insulation should withstand extreme temperatures.



SILICONE END-SEAL (right) is substantially smaller, unlike brittle glass endseal.



SOLDERING to capacitor lead is possible with intense heat.

throughout the line is about 20%, GE reports.

► **One Seal Trembles.**—The glass end-seals previously used in metal-clad tubular capacitors have been a continuous headache both to General Electric and

to equipment manufacturers and users, GE says.

In spite of special precautions and handling, a sizable percentage of GE's output went into scrap. Shipping a capacitor, or excessive heat when soldering on the capacitor's end leads, would break or break the seals.

Even worse, stresses set up in the glass as assembly, or cleaning processes may do a job that cannot be repaired. Broken at later date, A Bell Telephone Lab spokesman confirmed these glass seal troubles in answer to an Aviation Week inquiry.

► **Silicone Bonding.**—The new silicone bonding provides a good hermetic seal and makes the capacitor almost impervious to damage from normal handling or storage.

As a result of this, GE is also switching its line of Pyrax capacitors to the new silicone seal.

The Pyrax units are rated for temperatures of −55°C to +55°C, but can be used at temperatures up to 150°C with slight derating.

NATO Personnel Get GCA Course

(McGraw-Hill World News)

Frankfurt-Teknischen from NATO nations' air forces will learn how to maintain and trouble-shoot their U.S.-built GCA (ground control approach) systems at the USAFE Joint Maintenance Training Center in Fürstenfeld, near Munich, in a program designed to save the manpower required to teach maintenance techniques to the U. S. Air Force schools.

The first class, already underway, is training 100 British air force officers and 100 selected men. It will last 23 weeks.

Personnel from other NATO air forces will be qualified in new classes scheduled to be taught every 15 academic days.

Representatives of Griffler Brothers, Inc., of Los Angeles, who make the GCA equipment, a member of the 709th Technical Training Squadron, are serving as instructors.

Macroni Asks CAA Aid

(McGraw-Hill World News)

London-Macroni's Western Telegraph Company Ltd. has asked the Civil Aviation Administration to help issues a demonstration of its visual contact-range equipment now in an effort to compete with Gen. Electric's mobile Domes VOR and localizer equipment now being produced by Lucas of Coventry.

CAS officials here in London said they are trying to arrange the Macroni demonstration

It's a Small World

From tiny new components, too big at their initial size "the world's smallest" by their manufacturers, should small storage engineers in their continuing quest to achieve for size and weight reduction.

The devices are:



• **Tiny potentiometers.** These novel linear potentiometers are adjusted from a short shaft exposed at one end of the device. The design prevents loss of setting due to vibration in shock and pressure tests to be completely sealed as top of one section. Called Transport, it is available in resistances of 250 to 10,000 ohms at 1-watt ratings from Bourns Laboratories, 6135 Magnolia Ave., Riverside, Calif.



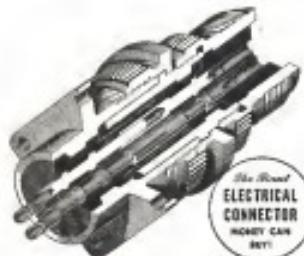
• **Microdyne capacitors.** New Type 999 Microdyne electrolytic capacitors only 0.175 in. in diameter and 1 in. long are now available in ratings up to 50 volts. Maximum operating temperature of 150°C max. However, these devices are in various components. Microdyne Radio Corp., 1617 Flushing Ave., Brooklyn 7, N. Y.



• **Parasite capacitors.** Patented called the "first negative parasitic polarization of infinite resolution," new Type 101 carbon-aluminum polarization is designed to cut in another analog of the micro-electrolytic operation where resistive insulation and small size are needed. Unit maximum 24 in. dia. by 11 in. long and weight one pound. Used for high-frequency transmission or measurement which allows frequency adjustment to losses or wave losses. Options for use available in single or multiple gang assemblies from Macromax Co., 1967 Utica Ave., Brooklyn, N. Y.

SCINFLEX ASSURES YOU THE LOWEST VOLTAGE DROP IN THE INDUSTRY!

With operating conditions demand no electrical connectors that will stand up under the most rugged environments, always choose Bendix Scinflex Electrical Connectors. The insert wire rail, an exclusive Bendix development, is one of our contributions to the electrical connector industry. The dielectric strength remains well above requirements within the temperature range of −63°F to +257°F. It makes possible a design increasing resistance to freshwater and salt spray. It withstands maximum conditions of current and voltage without breakdown. But that is only part of the story. It's also the reason why they are vibration proof and moisture-proof. So, naturally, it pays to specify Bendix Scinflex Connectors and get this extra protection. Our sales department will be glad to furnish complete information, on request.



BENDIX SCINFLEX ELECTRICAL CONNECTORS

Bendix

**SCINFLEX MANUFACTURED DIVISION OF
BENDIX CORPORATION**

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Eastern Branch Office: 1144 Broadway, New York 15, N. Y.
Midwest Sales Office: 300 Michigan Avenue, Chicago, Illinois 60601
Midwest Service Center: 1225 Michigan Avenue, Oak Brook, Illinois 60521

Insulating Varnish

Silicone Varnish 954 stands head and shoulders above other silicone electrical insulating varnishes known, its developer, Dow Corning Corp., Midland, Mich.

The new compound is used mainly for coating glass cloth and sheeting and for bonding insulation, encapsulation.

It is used to cover more than three times the dielectric life of similar products on the market.

At 40°F., company tests show 994 coatings have a dielectric life of more than 1,000 hr. and twice life exceeding 3,000 hr. flex life exceeds 100 hr. at 575°F.

The coating cures in about one hour at 482°F.

Dow Corning Corp., Midland, Mich.

Collins IFS Approved

Collins Radio has received CAA type certification of its Integrated Flight System for use on sedans. The Collins IFS provides airplane heading, attitude, roll, compass and ILS approach attitude information to the pilot via two multi-purpose instruments which can fit a panel four or five standard panel instruments. IFS, which is being used in more extensive type transport, is cur-

rently being evaluated by several major airlines, Collins says.



Console Recorder

A new professional console suitable for use with analog computers has been designed at a desk-type console by Goodrich Avionics Co. Console potentiometers located on the back panel of the new G-600 recorder can be connected into the analog computers, enabling the operator to change problem parameters and scale axes max without leaving the desk console.

The preceding discussions operate with either ink pens or carbonless cords or solid-state pulse position recorders. Resolution capability is on the order of one millisecond between 0.01 and 100 microseconds and frequency response is essentially flat to 100 cps when ink pens are used, Goodrich says.

5000' FILTER CENTER

New Navy GFE Policy—Under recently announced policy, Navy aircraft manufacturers will purchase all items consisting of the electrical generation and distribution systems used in their aircraft instead of buying some of these items supplied by the Navy as government-furnished equipment. Aircraft manufacturers must still select one product from Navy's approved list of products. This change is not expected to affect Navy policy under which communications, navigation and fire-control equipment are government-furnished.

N. Y. AMIC Surge VHF Frequency—An electronic interference encountered on one of its new remote VHF stations (Amherst, White Jim Mts., N.Y.) the New York Air Route Traffic Control center will swap frequencies with one of its local

(Doughnut) VHF. New frequency will be 121.7 mc., new frequency for Doughnut will be 123.9 mc.

Cleco Expands Avionics Interest—Cleco Corp., formerly Cleveland Graphite Electric Corp., has acquired majority stock interest in Thermoform Products, Inc., Boston, which was organized early in 1951 to develop and manufacture transistors and diodes. Cleco recently purchased Brush Electronics Co. of Cleveland which makes transistors, widely used in the aviation and aerospace industries.

Low-Eye-Copter Field-Test, Inc., is considering entering the helicopter autopilot field, as evidenced by recent engineering discussions with Sikorsky and Bell Aircraft engineers. Both Sikorsky and Bell have been developing their own helicopter autopilots. Pascual Helicopter Co., on the other hand, had previously turned to Minneapolis-Honeywell and Sperry Gyro for the development of autopilots for its heli-copters.

Seal-Max Capacitor Development—Seal Corp. is engaged in research and development for the development of subminiature capacitors for use with transistors. Industry needs smaller capacitors if space-saving potentialities of transistors are to be fully realized.

High-Flying Test Gear—Sonic Pulse Division will test its accuracy products in a new stratosphere chamber capable of reaching 150,000 ft altitude—PK.



TABLE TESTS SWITCHES

To speed testing of small memory switches used in its cockpit, Minnesota-Honeywell devised the motor-operated flip table. When switch is closed, pull of moving lever between two electrical contacts is close the contact. V.H.F. relay switches are subjected to 150,000 test operations.



triple threat

Changing temperature, vibrations, and accelerations affect the operation of all instruments. In spite of these variables, our products produce the right answers because they are properly designed.

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- ✓ OPTICAL PARTS AND DEVICES
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Current production is largely destined for our defense forces, but our research facilities, our skills and techniques, are available to solve unique solving solutions to instrumentation and control problems.



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MINUTES INSTEAD OF HOURS—In just 20 minutes, New York Airways' big Sikorsky S-61N can speed loads of mail between 3 major airports in the New York City area.

Mail trucks take hours. Eventually these helicopters will carry passengers and freight, as well as mail, in nearly New York, Connecticut and New Jersey.

AROUND THE WORLD WITH THE FLYING JACK-OF-ALL-TRADES



HIT AND RUN—U.S. Marine ingenuity and cooperation solved the problem of how to launch a rocket strike on enemy strong points, then shift positions before rocket smoke trails and dust could be used by the enemy as a guide for counter-battery fire. Here a Sikorsky Marine helicopter positions the rocket launcher and automation a short distance behind the front lines.



SAVING TIME AND EXPENSE—More efficient use of time is always an objective in modern business. To provide speedy, mobile transportation, the Rockwell Manufacturing Company of Pittsburgh, Pa., has adopted a Sikorsky S-61 to its extensive operations. Now engineers and operating executives go by helicopter from plant to plant. The company says overhead savings will be substantial.



LIFTED TO SAFETY—Hovering over simulated destruction, a Sikorsky helicopter shows its versatility at the Federal Civil Defense Staff College by plucking an "injured man" from the ruins of a "bombed" 5-story building. Civil Defense officials say "There is no limit to the work these helicopters can do . . . in time of war . . . in any emergency."



SIKORSKY AIRCRAFT

BRIDGEPORT, CONNECTICUT

One of the Four Divisions of United Aircraft Corporations

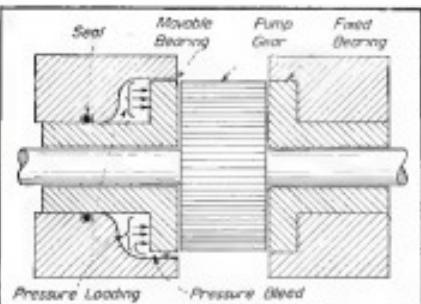


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SCHEMATIC DRAWING of pressure-loaded pump and its features.

to order each individual nut, bolt or screw separately.

► **Tough Pump**—Perco pumps have to handle many tough jobs. The fuel pump operates continuously at pressures up to 1,200 psi with volumes up to 92 gpm. The only lubrication is the fuel passing through them.

To do these tough jobs, Perco pumps are made to high precision. Journals are held to a tolerance of one micro-inch while gear faces are held to ± 2.0 light loads.

In order to solve a problem com-
mon to many pump manufacturers—
drive shaft and bearing—Perco uses
diaphragms coated with bronze to seal in oil when in the bearing housing,
thus limiting to ± 0.005 bearing clearance.
► **Electrical Division**—Not all of Perco's
activities are devoted to pumping fuel
or hydraulic fluids. It puts out a wide
range of electrical components, ranging
from 1/400 to 1 hp. Most of the motors are
4-c, but the company also makes 6-c
line for from 6 to 150 rpm.

Perco claims maximum bearing wear is
at 100,000 hours, especially at high altitudes,
as a result of good construction.

Since we coal-burner manufacturers
of electric motor, fuel and hydraulic
pump packages, the company can per-
form welding of the drives and drivers
components if possible, saving weight
and presenting considerable flexibility
of design.

► **Pneumatic Drive**—In addition to liq-
uid drive and electric drives, Perco has
gone into pneumatic drives. On jet
aircraft, where compressed air is much
more readily available than on recip-
rocating piston, pneumatic is getting in-
creasing attention.

The company is in production on
air-driven centrifugal water pumps for



DEAL-FLEXIMENT, prototype pump with
pressure-loaded bearings

water injection systems for 147 power
plants used in North America's fleet
at B-57 bombers.

► **Factory Test**—Each aircraft pump or
motor made at Perco is individually con-
tinuously tested at the factory. Each
unit's records are kept on file for future
reference. To keep up with expanding
production, six new dynamometers, cap-
able of 30 to 1000-hp output are being
installed in the company's production
test department.

Perco has selected a simple gear
type hydraulic pump for 5,000 psi op-
eration at Wright Field. Other samples of
this pump are in advanced stages of
development and are now being sub-
jected to test in the company's labora-
tory tanks.

Perco's employment now stands at
1,400 and is increasing. The company
has a plant at Dallas, TX (March-
Schleicher) and a new division in Shreve-
port, LA (Woolard, Goss).

The firm, a division of Sung-Warren
Corp., had \$23-million revenues in 1952.
Its executives predict a 40% increase in
1953.

SPS aircraft fasteners

UNBRAKO



**STANDARD
"SIX-BIT"**
ENGINE BOLTS

All listed dimensions
—hex and internal
wrenching types, AN
specifications.



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Close tolerances,
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fully formed by
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INFORMATION UPON REQUEST. ADDRESS DEPARTMENT SP.

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**FLEXLOC SELF-
LOCKING NUTS,
REGULAR TYPE**

Non-adjustable nuts.
One piece construction re-
quires no lock washers.
Alloy Steel, including the locking
threads, meets or exceeds
all of the following: MIL-R-10200.
Fusible fasteners, but
have weight advantage.
Alloy Steel, Approved,
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**FLEXLOC SELF-
LOCKING NUTS,
THIN TYPE**

Non-adjustable nuts.
One piece construction re-
quires no lock washers.
Alloy Steel, including the locking
threads, meets or exceeds
all of the following: MIL-R-10200.
Fusible fasteners, but
have weight advantage.
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**FLEXLOC EXTERNAL
WRENCHING NUTS**

Incorporates standard
FLEXLOC self-locking princi-
ples and concepts, with
internal construction based
upon MIL-R-10200.
Fusible fasteners, but
have weight advantage.
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INFORMATION ABOUT FLEXLOC ON REQUEST. ADDRESS DEPARTMENT SP,
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STANDARD FRIEDRICH STEEL CO., JENKINTOWN, PA., PENNSYLVANIA

backed by the skills
which originated Teleglas...
standard in TV picture tubes



One of the major advances in television reception is the result of Pittsburgh Plate Glass Company research that produced Teleglas. Within less than a year after its first commercial use, this "gray glass" had become the industry's standard facing for cathode-ray picture tubes. The sharp contrast and the definition of dancing highlights, faded grays and "blows" are the contribution of FPG Teleglas to the modern television receiver.

A leader in glass research—with 75 years' experience in large volume glazemaking—Pittsburgh Plate Glass Company is now driving upon these skills in the manufacture and development of Fiber Glass. If your products use Fiber Glass—either Surface Insulation, or Term, Screen or Housing—they may be advantages you can obtain by specifying "Pittsburgh." You are invited to obtain complete information on facilities for serving you Pittsburgh Plate Glass Company, 632 Duquesne Way, Pittsburgh 22, Pa.

Making products better, safer, lighter, stronger

If your products need light weight, durable insulation . . . if they require exceptionally strong reinforced plastic . . . if they need tough, wear-resistant materials . . . if they must withstand extreme temperatures . . . then FPG Fiber Glass may be an important factor in your planning. Field engineering service, product data and other information may be obtained through executive offices in Pittsburgh, or district sales offices in Chicago, Cincinnati, Cleveland, Detroit, New York and Washington.



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PITTSBURGH PLATE GLASS COMPANY

pipe thread or the coupling is designed to permit continued operation of a straight end even with the old coupling can be replaced.

Excell's new coupling has been tested at 1,000 psi in line of from 3 to 12 in. trade diameter, using a standard O ring seal.

Eastman Mfg. Co., Macon, Ga., West



Efficient Armature

A new line of Barber Colman motion has no armature weighing 25% more (efficiency) than any other switch motor now produced, the manufacturer claims.

The armature is said to be "self" for direct gear drive, armature, field and brushless, and rapid-breakaway switches.

The armature winding is described as completely symmetrical, providing "true" electrical balance, capacitor compensation and low radio wave interference.

Speeds range from 5,000 to 20,000 rpm. Units for 6 & 115 V d.c. operation can be supplied. At a short-duty cycle, up to 45 mill kg is attainable for 5 v d.c.

Barber Colman Co., Rockford, Ill.



Safe Gauge

A pressure gauge set to combine protection to the viewer with easy access to main movement and tube assembly as its set to inspection, recalibration and repair is the Maxxair Design gauge. The gauge has an entirely cut solid will separating the dial face movement and tube. A double spring mounted safety sleeve plate, which permits the

AIRCRAFT
ENGINE BUILDERS
LOOK TO

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For Volume Machining of Jet Blades



A production department for machining the stiff form of jet engine blades



Finished jet-engine
compressor rotor



A complete line of automatic blade blanking machines, designed and perfected at Ex-Cell-O, turns out large volumes of precision parts to the specifications of engine builders. In addition, Ex-Cell-O, through its subsidiary, Reliable Engineering Company, machines rotor wheels, inserts the blades, and assembles the complete rotors.

Plant facilities have been expanded and skilled employees have been trained in the machining and inspection of these precision parts and assemblies.

As one of the world's largest producers of precision parts for aircraft engines, Ex-Cell-O can help you eliminate bottlenecks and meet production schedules. For information or a quotation on your precision parts, contact Ex-Cell-O in Detroit.

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The ultimate answer in check valve security, Circle-Seal valves feature a unique new pressure relief feature. With the valve fully seated, pressure is relieved.

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40¢ gal. 2½¢ 99¢ 2½
40¢ gal. 2½¢ 99¢ 2½

South
Carolina—
Midway between
New York
and Miami

SOUTH CAROLINA
AERONAUTICS
COMMISSION

explosive discharge of pressure results stop from the valves, across the back of the case. Less than 4 psi pressure forces open the plate, the microswitch trips.

The Monel line includes gauges for pressures up to 100,000 psi. Manning, Marable & Moore, Inc., Bristol, Conn.



Aircraft Hose Fittings

Carbon steel elbow fittings for aircraft have been designed to make suitable those more compact at turns and bends—now being produced by Aerostatics Corp.

The 45 and 90-degree elbows are being used in gas charge systems, pilot oxygen tank inflation, jet engine and other close-quarter airplane locations, the manufacturer says.

The fittings have male ends for use with 4- and 5-in. MIL-H-5511 hose. External angle fittings are made by turning the hose end to a standard, one-piece body of the part. No brazing or welded joints are used, and male adapters are not needed for fitting the part to hose. Straight adapters provide an alternative of maximum length.

Rentekox Corp., Bellflower, Calif. 90220



Trim Router

A new trim routing machine has been developed by Electron Carbon & Co. for carpeting, lugs and related non-flame-resistant aircraft interiors. The Electron, Carson, Calif. No. 527-T

'S' Monel...

an extra-hard casting alloy
that resists galling and
seizing at high temperatures



Below the base of dry stars. Shown here fully assembled is the bonding tape for a jet engine turbine shaft. This bearing runs dry during the first moments of starting, causing a galling problem for the retaining ring. The retaining ring (arrow) between the sleeve and outer races is a conventional snap ring of "S" Monel, cost by 20%. "S" Monel not only offers a high degree of resistance to galling, but also retains its hardness at temperatures up to 1,000° F.

Whenever you're looking for hardness in a corrosion-resisting metal, it's a good idea to review the characteristics of "S" Monel.

"S" Monel is one of the hardest and strongest of the non-derivable alloys available in cast form. What's more, it combines the inherent corrosion resistance of Monel with two particularly valuable features: 1) twice hardness at high temperatures, and 2) resistance to galling and seizing. "S" Monel, in fact, maintains a hardness nearly as great as heat-treated steel. Temperatures reaching as high as 1,000° F. have but slight effect on its hardness.

There have been instances where "S" Monel has shown unusual resistance to seizing, despite poor lubrication—or no lubrication at all!

Another property of "S" Monel is that it is non-

reactive and stays that way at all temperatures down to -10° F.

It is this combination of exceptional properties—and the ability to retain them at high temperatures—that makes "S" Monel especially useful for cast precision parts that can be coated on to—

- take the heat of high heat
- maintain elements alignment at high heat
- resist galling and seizing
- retain their resistance to corrosion, erosion and wear

You'll find further information on "S" Monel in our bulletin, *Tech Standard Alloys for Special Problems*. Your copy is ready and waiting. Write for it now! And consult your distributor of Inco Nickel Alloys for the latest information on their availability from warehouse and mill. Remember, too—it always helps to anticipate your requirements well in advance.

The International Nickel Company, Inc., 67 Wall Street, New York 5, N.Y.

Inco Nickel Alloys

INCO • "P" MONEL • "K" 10 MONEL • "W" 10 MONEL
MONEL • INCONEL • X • INCOLLOY • MONELCO
"S" MONEL • NICKEL • LOW CARBON NICKEL • ALUMINUM-NICKEL



Mechanical Properties of "S" Monel

Test	Value	Test	Value
Tensile Strength	21,110 lb/in.²	Impact Strength	150-14,200 ft-lb
Yield Strength	4,710 lb/in.²	Hardness (Rockwell C)	47-57
Creep Resistance	140-375	Coefficient of Thermal Expansion (20-250° F.) in 10⁻⁶/in.° F.	10.0-10.6

Resistances of "S" Monel at Elevated Temperatures

Temperature, °F.	Steel Resistance
100	221
200	230
300	211
400	111
500	90
600	61
700	21
800	11
900	1
1,000	211

**Pump Design and Experience
PAY OFF in Performance**



"We have the Douglas Navy D-558-2 drops from the belly of its mother ship, turbine driven centrifugal pumps whet their task of keeping the four enormous rocket engines supplied with fuel. Both the fuel and liquid oxygen pumps are by Carter.

CARTER SERVES HERE, TOO



THE FAMOUS GAS WARRIOR. One of the most powerful reactors in intercontinental fighter aircraft is mid-air refueling. Carter designed and manufactured pumps ensure the successful transfer of fuel from the Boeing Flying Boom tank to many of today's aircraft.

Carter design equipment is also in service on F-104 Starfighter, B-57 Canberra, F7U Cutlass and F4D Skyray.

OTHER CARTER ACHIEVEMENTS

Special Purpose Fuel Valves

Typical Carter developments in this field are:

Fuel Flow Limiters • Pressure Fueling Headers • Fuel Vent Relief Valves
Fuel Pressure Limiters • Pressure Fueling Adapters • Fuel Tank Relief Valves

Carter capacity and experience are available to you for the design, development, application, and manufacture of specialized fuel-handling components.



Tomorrow's Pumps - Today

THE J. C. CARTER COMPANY

233 No. Fox Oak Avenue, Pasadena 1, California

include two spindle speeds, 10,000 and 20,000 rpm, and is driven by motors of 5, 10, or 15 hp. Throat diameter is .271 in. Adjustable distance between the spindles is .5 in., giving a bore hole range from .3 to .94 in. Main axis stroke of the gageless bores is .61 in.

Eaton, Cushman & Co., 1400 Radford Ave., Rockford, Ill.

ALSO ON THE MARKET

Longer-life welding helmets made of Fiberglass are said to be stronger and more durable than present types, yet lighter weight. United States Safety Service Co., 1215 McGraw St., Kansas City, Mo.

Gears are cut with precision inspection devices which require five tools for three-dimensional cutting of precision machined parts, according to developer. Setups are quicker and fewer gears are used, says Sherman Tool & Machine Products, Inc., Erie, Pa.

Small metalite helmets for airborne case parents can be used as control units if sizes are known and size. It is designed to resist a wide temperature and pressure range and can be used on shafts as small as 8 in. in diameter. Claffey Mfg. Co., Waltham, Mass.

Portable vacuum tester will test small fuel tanks, depleters, bellows, pneumatic valves and other small parts. Adjustable for vacuum and heat cycle, this low-cost tester includes vacuum pump, heating plate and numerous special parts. Flair Mfg. Co., 1665 S. Kilbourn Ave., Chicago.

Rubber plastic bearing material needs no lubrication, has high load capacity (1000) and low coefficient of friction, yet performs other metal and plastic bearing materials, according to maker—Dunc-Lubricating Saddle Co., Bristol, R. I.

Short-Stop assembly for Goss-Camp hand tools improves stopping of trimmers and shearers conforming to Spec MIL-W-5560. It features the standard model mounted from both ends along with the wire in the internal lever—Aerosol-Motor Products, Inc., Herkimer, N.Y.

Pench press with slow, powerful stroke (from heavy static-loaded back gear being speed range down 40 to 100 strokes per minute) can be used for drawing, forming and other metal operations not generally done on the machine—Benzenechuck Mfg. Co., 1835 Rosemead Ave., Glendale, Calif.



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Just as far as you can see!

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they do the most amazing things!*



A lot of the performance in terms of smooth even power is due to the precision-made Roto Transmission manufactured by the Steel Products Engineering Company for the Bell Aircraft Corporation.

For 25 years we have been designing and producing gears, gear assemblies, and other components which have the highest possible precision characteristics.

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Our First Officer is the research of the Lockheed Lodestar owned by the North American Company, testing models of commercial aircraft. The Lodestar has a Tammervell 8-38.

Ask the men with the most experience . . .

ask Clarence B. Owen, Jr.

Chief Pilot, Smith-Douglas Co., Inc., Norfolk, Va.

"With nine factories—scattered from Virginia and North Carolina to Louisiana, and up into Illinois—our company brings its two planes mighty busy," says Mr. Owen, a pilot who's logged 8,000 hours in the last 14 years. "And everywhere we fly, we know

we can count on Gulf for the same fine quality products and the same fine service. That customer excellence is one of the big reasons why our company, for the last six years, has made it a point to "Go Gulf."



Gulf Aircraft Engine Oil, Series-E

For radial engines, or where a detergent oil is not desired. Approved by Pratt & Whitney and other radial engine manufacturers for all types of service. Recommended and chosen because it retains its body at high operating temperatures.



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For horizontally opposed and Ranger in-line engines. Minimum ring and valve sticking, oil consumption, cylinder clamping and fueling. Users of this oil will have entirely eliminated periodic lubricant engine overhauls as much as 100%.



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To step up performance, and cut operating costs . . . GO GULF!

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FINANCIAL

Net, Sales Up for North American

Dividend rate rises to 75 cents a share as net after taxes hits \$7.8 million on sales of \$315 million.

Increased profitability of the aircraft industry as a whole last year is reflected in the annual report recently released by North American Aviation, Inc.

For the fiscal year ended Sept. 31, 1952, the aircraft producer reported total sales of more than \$315.2 million, up some 75% from the 1951 fiscal year.

Net income after taxes reached \$7.8 million, at \$1.25 per share, a 21% increase over 1951 earnings of \$6.4 million. Net income for 1952 was slightly below the 1949 net of about \$11 million, but 52.5% per share.

Net sales for the 1952 period were less than one-half of the \$580-million record established during the war year, 1944, but higher than that for 1941 and 1942.

Like all normal aircraft reports of recent years, the North American statement gives detailed presentation of the company's financial position. For example, the company reported net 1952 earnings before taxes of \$10.3 million. Provision for federal income taxes took \$12.5 million, or \$1.25. For 1951 the tax bill took about \$10.5 million, or 1949, only \$7.5.

Primarily as a result of the heavier test imports, net profit margin on sales for 1952 was down to a postwar level of 2.3%. This compares with 7.2% for 1949 and 3.6% for 1941. Net revenue in the current net worth for 1952 was down to 16.1% as compared with 17.2% for 1950.

Dividends Increased.—While netted dividends representing about \$4.7 million, or \$0.35 per share on the 1475000 shares outstanding, remained unchanged for the three-year period ended Sept. 30, 1952, an increase for the current fiscal period has now been effected. A dividend of 75 cents per share was paid in December 1952, and a proposed sum of 50 cents paid a year earlier.

It is significant that, of the \$34.4 million in net earnings accumulated during the five-year period ended Sept. 30, 1952, only \$10.8 million, or less than one-half, has been paid out in the form of dividends, the balance being retained in the enterprise.

Much of the retained earnings has been ploughed back into plant and fa-

cilities. For example, at Sept. 30, 1947, the company showed a property, plant, and equipment account with a net book value of \$1.7 million. Five years later at Sept. 30, 1952, this account had increased \$15.3 million to a total of \$17 million.

During fiscal 1952, gross capital expenditures amounted to \$7.4 million.

Additional facilities and equipment

amounted principally to manufacturing buildings at the Los Angeles plant site and new machinery and equipment. Depreciation of \$10.74 million was provided and the net book value of properties, plant, and equipment increased by \$6.655.31.

Of the gross capital expenditures, approximately \$2.8 million was spent by verification of necessity permitting accelerated depreciation over a five-year period.

To finance its expanding volume of operations, the company resorted to the usual methods of bank loans and short-term notes.

At Sept. 30, 1952, such loans stood at \$10.5 million, but were increased to \$60.5 million at Dec. 31, 1952.

Huge Operations.—An indication of the magnitude of North American operations can be seen from a brief analysis of its current assets.

For example, working-progress inventories, on which title was held by the government, amounted to about \$20.2 million as of Jan. 1, 1953, when a program payment of \$21.0 million was received, leaving a balance of \$1.8 million as of Sept. 30, 1952.

In addition, more than \$12.6 million was accumulated as accounts receivable due from the government as of Dec. 31, 1952. With these and other elements, net working capital stood at \$40.4 million at the last fiscal year-end.

Net worth had increased to \$83.4 million, or \$7.71 per share at Sept. 30, 1952, up from \$7.59 million at \$1.65 per share at Sept. 30, 1951.

At Sept. 30, 1952, net worth amounted to slightly more than \$11 billion. Together with losses aggregating \$907 million in the process of amalgamation, total backlog was estimated at \$1.523 million.

In viewing the future, North American's management expresses the belief that under present schedules, a further increase in net wills be expected during the next two fiscal years. The

amount of revenue at earnings will depend to a considerable extent upon tax policies.

The optimistic outlook has been borne out by the results of the first quarter of the company's present fiscal year. For the quarter ended Dec. 31, 1952, North American recorded sales of \$162.5 million and net income, after taxes, of \$17.4 million, or 50.76 per share. This compares with sales of \$15.7 million and net income of \$1.575.308, or 50.46 per share, for the same 1951 quarter.

Research Programs.—Not appearing in any of the balance sheet and income statement but of underlying importance to the company's past and future success is the vast scale of pioneering research and development constantly being pursued.

Of the 10,040 employees, 1000 are engaged in its applied engineering groups and more than 4,000 are in engineering and research projects, involving research, standard equipment, and the use of atomic energy.

The annual report sincerely states the "company's future success and ultimate future security are now being shaped by the thousands of engineers and scientists who are exploring new frontiers of stratospheric, space, aircraft, propulsion, electronics, and even atomic energy." Research and applied development is still the biggest part of the total job. But productivity is growing rapidly, as are programs involving control equipment and rocket propulsion. At the same time, in new fields never known, new applications, both consumer and military, suggest themselves.

Advanced Facilities.—The company further notes that it "has built and is now utilizing some of the most advanced facilities operated by industry, ranging from supersonic windtunnels to ground test facilities."

The leading edge of the research activities being conducted by North American particularly emphasizes the importance which is attached to guided missiles and the various fields of electronics.

In all this activity, management clearly recognizes a responsibility to make substantial expenditures of company funds and time in the interest of the nation's welfare. While this policy may appear somewhat extravagant to certain individuals, the long run results should be the benefit through the company's ability to develop and produce items required by the military services.

Management sums up this view with this observation: "The key to the future is ability to stay ahead in the never-ending technical race."

—Selig Altmann

AIR TRANSPORT

ACC Faces Tough Civil-Military Decisions

- Air transport production priorities on agenda.
- Early answers by mixed membership unlikely.

Air Coordinating Committee, another agency working to study U.S. civil and military aviation policy, will face a tough agenda later this week, at its first meeting under President Eisenhower's Administrations.

Representation of the regular airways, including those now being considered for the following problems pending for early decision:

- Air Force-authorized flight over part of China's new Chinese Arctic and Gobiavia. Managerial Assistant Ruth ACC and former President Truman found this use too hot to handle. Truman recommended that Air Force keep its jet intercept units at Offutt but "over-ride" rules for a "strategic" aircraft location. Gobiavia is a new problem, with civil users claiming the route is best suited to Air Force. For jet intercept, Congress has told the Air Force during the past two years to save money by reducing some of the heavy transferred to civil and managerial operation after World War II, with sizable losses.

• TV broadcast-CAA flight regulations. Aeronautical Information Service has recommended deletion of about 30 TV broadcast transmission stations as a means to relieve traffic. Federal Communications Commission has gone along with the ACC recommendation to date.

• Production priorities for new airframe transports after the Defense Production Act expires this June. ACC has recommended and called for revised for equal defense, industrial, and commercial needs priority for production of civil and military heavy transports and industrial aircraft.

• Civil aircraft production priority goals with Defense. Because they are in service with Defense, Air Forces contracts provide new defense for modified for 49 hr. scheduling by Military Air Transport Service. That places Air on the same production lines as military transports.

Priority Civil Aircraft Production

(Approved to date by Air Coordinating Committee and Defense Production Administration)

	All aircraft	Non-intercept	Total
1951	125	133	2180
1952	221	242	5,197
1953	222	233	6,631
1954	183	234	7,195
1955 (1st quarter)	8	351 (for 2 qtrs.)	2,480
Total	746	Total	18,006

Transport Type

Two-engine	430	U.S.	576
Four-engine	356	Foreign	172

Note: Actual air transport production has not equaled measured volume stated by agency.

Source: Air Coordinating Committee annual report for 1954

• Priority recommendations by ACC expected to have civil transports and federal airports. Assuming such designation, ACC may require individual prioritization of new order by claimant agencies. One potential outcome may arise from a Civil Aeronautics Administration recommendation of priority for F-100B ordered by North American Aviation, larger named on caption. Civil Aviation Board chairman Donald Byrd was silent, but CAA's position was not decided early last week. An ACC analysis is expected to resolve that one F-100 is competent, useful operation in a paid military source as another. Corporation order for aircraft versions of aircraft have been recommended separately by CAA and approved by Defense. Decision remains in the last two years.

• U.S. systems surveillance system selected by ACC appears to be "Institutions interconnection," in line with a resolved date by the U.S. Inter-national Civil Aviation Organization to complete international air traffic and travel.

• Air navigation standards, a dispute between Navy, Air Force and civil users, up for ACC resolution. This inter-service dispute developed in the National Committee Defense Department Board and Defense Civil Board two year ago and made recent decision of the Air Navigation Development Board.

• Recovery approach clearance from obstructions in federal flying, as recommended by President Truman's (Budget) Airport Commission. It conflicts with Defense's

with states' rights and congressional rising power ACC may ask President Eisenhower to stay clarifying legislation.

► ACC, Bethesda—Action on these controversial items may be delayed at the first few days of January under the Eisenhower Administration. Here are the reasons:

■ ACC: Due to Air Force concern over because of the withdrawal of R.C. Spaatz's association for the under-secretaryship.

■ Three other committee members will be accustomed to aviation and ACC.

■ Remaining members are opponents of the Truman Administration and may not share their former degree of power to control their departments or agencies in controversial areas of the ACC unless the new administration is more lenient.

► ACC, Committee Member—New ACC chairman will be Thomas Undersecretary H. Chapman Rose, Commerce Undersecretary for Transport Com Robert B. Morris, and Assistant Postmaster General John C. Allen. The experienced per November members are J. Paul Barringer, State Department Director of Transport and Communications Agency Undersecretary Earl D. Johnson, Navy Assistant Secretary John DeLoach, Milton M. Tolson, Air Force Undersecretary ACC Undersecretary for Civil Aviation Capt. Ross L. T. Walker from War Materiel Bureau (resigned his post as ACC undersecretary), Deputy Director, State of the Air Force, National Security Resources Board a terrorist because a strict "reduction in force" has almost wiped out that agency.

► ACC Powers—The ACC members,



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SHORTLINES

► **Air Line Pilots Assn.** plans to ask CAB to review its investigation report finding "pilot error" the main cause of the Jan. 10, 1952, crash of Pan American's Boeing 707. It is asking the Board to review similar findings of the fatal Pan American DC-4 crash of Sept. 1951. The CAB reports note an oral technical failure of equipment and experience but by final review on the pilot.

► **Air Materiel Command** may offer 30 C-46s for airline leases or freighters.

► **Air Transport Associates, Inc.**, now led by Anton Hecker since CAB reorganization, is discussing sales affiliation with major foreign carriers. CAB would be given the new ATA can fly authority charter note, if letter is issued.

► **Aeroplane Airlines** has a new CAB certificate, with routes transferred from

its former All American Airways certificate, now rescinded.

► **Braniff Airways'** challenge of the \$3 cost fuel tax rule had rate cut by CAB, effective since the RNF merger with Mid-Continent May 10, which is now曳rate cut for the period from that date. CAB expects to give Order to Amend to cover the period Oct. 1, 1951, to Nov. 9, 1952, to accommodate Post Office wants to require Braniff to set up an "airmail equilibrium status" on the theory that it is a mailline airmail post office revenue that might require payment of a higher rate.

► **Canadian Pacific Airlines** will start jet Convair aircraft Sydney-Honolulu April 25. CPA will use DC-8s from Honolulu to Vancouver until 1954, when it plans to open this long loop with the Mack III Clipper.

► **Mexico International Airport** has established an air express branch, providing same day routes to major cities in U.S. and Latin America from Mexico.



DC-7 NEARS FLIGHT

Douglas DC-7 is shown getting its wings at the first aerial photograph of the new four-engine aircraft. Described as the "world's fastest piston-powered transport," the DC-7 will have an average crossing speed of 340 mph, and a top speed of more than 400 mph. It is the first aircraft constructed from large quantities of aluminum metal. The transport is more than eight feet longer than the DC-6 and will seat from 80 to 95 passengers. Douglas expects 50 DC-7s already have been ordered.

AVIATION WEEK, February 21, 1952

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AVIATION WEEK, February 21, 1952

EDITORIAL

How a Business Press Can Serve Its Industry

The aeronautic and aerospace industries and their individual companies spend hundreds of thousands of dollars every year on their public and press relations departments. Such a major expenditure is an accurate gauge of the importance they attach to proper public information.

A business magazine press that is aggressive, enterprising and truthful can be a powerful ally of any industry, and usually is. But strangely, the role of an industry or business magazine is frequently misinterpreted or its power for good is underestimated by the very people it helps or could help best.

The most obvious role of the business magazine, of course, is to report the significant economic, technical and political developments without fear or favor. That objective is more often difficult than easy to attain, and the background of Aviation Week's lead story in its Feb. 9 issue is a case in point. The result, however, was a better informed public and industry, because two correspondents and their sources were able to tell the world about their latest fighting plane.

We asked our managing editor, Robert Hora—who also heads up our Washington staff—to send us an informed play-by-play account of how the due authentication and officially released news on the Douglas Skyrayght (F3D) Marine night fighter and its combat victories got into newspapers all over the world.

Here is Mr. Hora's memo detailing the work and time involved in putting out a story you probably read in your newspaper:

"First tip came from Navy Butler, where I was shown an undischarged flight deck from Korea stating that F3D night fighters had destroyed two Russian-built jets at night over MiG Alley. Tegan checked USAF, Marines and Douglas for data on the rapidly growing night achievements. USAF cooperated with details on B-29 night losses to Red fighters.

"Marines admitted first daylight losses VMF-513 Marine night fighter squadron in Korea had come in unchallenged but said a dispatch several days later ordered a stop on it for security reasons. Second dispatch was classified secret so it wasn't distributed to recipients of first dispatch.

"Douglas public relations people told me they had been working for months to get the Skyrayght story cleared, with no success. Marine headquarters said they felt story should be cleared now since first action had been in November, last Fifth Air Force in Seoul, under which VMF-513 operated, was happening daily.

"I went to USAF Headquarters in Pentagon with queries of night fighters being used to escort B-29s to North Korea; if so, what types and had they destroyed any Red night fighters?

"Reply from Fifth Air Force said night fighter story was being held up by Marines and Fifth had no objection to publication.

—Robert H. Wood

"Showed this to Marines and asked who was holding what? On same day Naval Aviation News' unrestricted edition appeared with逸ories of two PFD Marine Red night fighter kills in Korea. I took the Marines, USAF and Douglas there appeared to be no legitimate security restriction on story since both Marines and USAF agreed and I intended to publish story in our next edition Feb. 8.

"Gave copy of my story to Marines and requested them to let me know before Feb. 1 if there were any details involving security. On Feb. 3 Marines asked me to do a story for a week. I explained prior publications of F3D story in Naval Aviation News and fact that broaching officer in weekly Pentagon press briefing on Korea had mentioned F3D shooting down a Red fighter on night escort of B-29. Furthermore, none of the correspondents attending bumbled to the tip but that was just lucky.

"So Marines cabled VMF-513 in Korea on Feb. 4 and a few days before we they could appear—while it was on the press—they released the F3D story in Korea. Reason for "leaking" Aviation Week was given in the interest of maintaining good press relations in Tokyo. AP and other wire services wrote story on F3D in action that spanned statewide papers on Thursday, Feb. 5, and Feb. 6.

"Then USAF hurriedly called out release on fact that its Lockheed F4H night fighters were also in action in Korea, thus taking some headlines from Marines. This was a story Lockheed public relations had been trying to break loose for some time.

"Our story appeared Feb. 9 with full fact details on the aerial night battle of MiG Alley, including names of pilots and radar operators who made the kills.

"This is just another example of how military security considerations are abused by military authorities to accomplish purposes other than maintaining legitimate military security.

"Defense Department Information Director Andrew Feeding, a former AP correspondent who should have known better, recently blithely stated that he thought there would be no such thing as an "exclusive" story on military matters. If a correspondent's query uncovered a good story, he said the military would make the news available to everybody. It is quite evident that the military is practicing what Ringer practices and Pentagon correspondents are doing their best to handle competitive stories outside normal interaction and security releases should as far as possible be based on a platter to their competitors."

It is still a minority opinion in aviation, although it is diminishing through the months, that the business press best that depends most on "official" press releases, company and government briefings. The story above presents just one dramatic example showing scores of how a powerful business paper of integrity can perform a public information service for industry that industry itself cannot perform alone.

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With General Electric G-3 flight control, pilot can automatically level off, at high altitude, from a roll maneuver like that shown above

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New advances in autopilots for Navy jets

General Electric G-3 flight control aids jet performance six ways...

is slated for Navy's new carrier jet, McDonnell F3H "Demon"

Designed specifically for high-speed jet aircraft, General Electric's G-3 autopilot is now installed in Douglas F3D-2 Skynights, Grumman F9F-5P Panthers, and the new swept-wing Grumman F9F-6P Cougar. A G-3 autopilot will soon go into the Navy's newest carrier jet—the McDonnell F3H "Demon." Purpose? The G-3 gives *specialized* aid to a plane's flight performance; performs such jobs as suppression of dutch-roll and high-frequency oscillation. G-3s also

provide continuous automatic synchronization, automatic altitude control, and "level-out" and maneuver holding functions.

If you would like more information on the G-3 autopilot, why not write for bulletin GEA-5741? It's a good idea, too, to talk first with a G-E Aviation Specialist, whether you need stabilizing or complete flight control systems. *Section 210-70, General Electric Company, Schenectady 5, N. Y.*

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